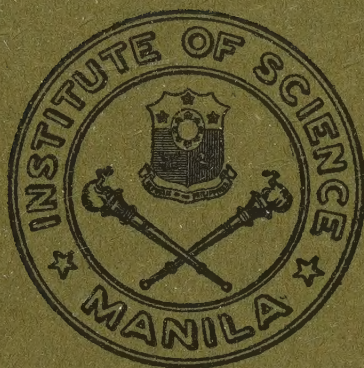


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THE PHILIPPINE JOURNAL OF SCIENCE

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THE ORIGIN OF THE PHILIPPINE FERN FLORA*

By EDWIN B. COPELAND

Of the University of California, Berkeley

It is generally accepted doctrine that floras develop on continents, and spread thence to islands; that, while islands have their endemic species, and sometimes endemic genera, usually locally evolved, floras as a whole are not of insular origin. So, the Philippines, as individual islands and as an archipelago, rich as they are in endemics, owe the parents of these endemics, along with their flora as a whole, to immigration.

Our subject this evening is the source of this immigration. As a matter of obvious geography, it can have three possible immediate sources: (1) Continental Asia, from China to Northern Luzon. (2) From the South-West, immediately, from Borneo. (3) From the South and South-East, immediately from Celebes and New Guinea; eventually from a source which has not until recently been obvious, and not usually even suspected. Large as New Guinea and Borneo are, they are not continents and have not functioned as such.

Ferns are propagated by spores, so small and light that, once taken up by the wind, they can be carried to great distances. Some spores are viable only for a number of days, others for a number of years. In no case is viability so limited as to be a bar to dispersal. Effective limitation is imposed by the mass of spores taken up by the general winds, and by the size and suitability of the target, where the spores come down, and

* Read before the Philippine Orchid Society, May 24, 1949.

must find themselves in fit places for germination, and then for growth to maturity.

Ferns from Celebes and Borneo find suitable climatic conditions in Mindanao and Palawan. But each species must find suitable local conditions,—lowland or mountain, locally dryish or humid, open grass-land, or the light shade of open woods, or the dense shade of the rain forest, soil, or rocks, or the mossy branches of trees. Some species are narrowly limited as to the places where they can live; others comparatively catholic in their demands. A common species gives off clouds of spores, and is far more likely to effect migration than is a rare species. Thus it is a general rule that common species are wide-spread, and conversely that wide-spread species are likely to be common locally. Also, common species usually become so because they are not very narrowly restricted as to the tolerable habitat.

Our basic evidence as to migration is provided by present distribution; and it must be emphasized that this means by our present knowledge of distribution. A species known only in the Philippines is regarded as endemic, and is only indirectly (by means of argument) available as evidence of origin or migration. If next year it be found in New Guinea or Borneo or Formosa, it ceases to be endemic, and becomes evidence of migration, in one direction or the other. Confidence in our arguments and conclusions depends absolutely on our knowledge of the ferns of the Philippines and of all neighboring lands.

However much the future may still reveal about our Philippine ferns, we already know them well enough to make it almost impossible that future discoveries will materially modify conclusions soundly based on present knowledge. Forty years ago, our knowledge of the ferns of Borneo and New Guinea was so imperfect that the conditions as I see them to-day could not be suspected. During these four decades, so much has been discovered that I can draw general conclusions with a measure of confidence. But it is still true that in detail our knowledge of the sources of our flora will be improved and perfected by collections in other lands, far more than by future local discoveries.

Basic facts as to our fern flora are that 938 species are known. Of these, 444 seem to be endemic, and 494 to be known elsewhere. Of these 494, 62 are known only in lands to the North and North-West,—China, Formosa; these I call the Chinese component of our fern flora. Fifty-seven are known

only from the South-East,—New Guinea, the Moluccas, the Admiralty Islands, Minahasa; for convenience, I call these the component of direct New Guinea origin. One hundred thirty-nine are known only to the South-West, the Malay region; because Borneo is our nearest neighbor in that direction, I will refer to these as Bornean. Two hundred thirty-six species, almost half of our non-endemics, have a wider range, including New Guinea and Malaya. This last list includes a few cosmopolitan or Pantropic species, which would not be good evidence, but which are too few to weaken conclusions.

As to the Chinese component of our non-endemics:

46 species are known in the Philippines, except in Northern Luzon or South of China on the continent.

10 species are more or less common in Northern Luzon, and are rare farther South, and do not occur South of China.

6 species are common in the Philippines, but only Northern in Asia.

There are 20 other species restricted in the Philippines to Northern Luzon, but ranging farther South elsewhere, some of them even to Java. If they are immigrants, their origin is uncertain.

Even though Asia be a continent and Luzon an island, a species common to China and Luzon is not sure to have migrated from China. We can say with confidence that the most of them did so, but 15 of them seem more likely to have migrated in the other direction. Of the 62 species known otherwise only from more Northern lands, this leaves 47, less than one-tenth of our immigrant fern species, which seem probably to be immigrants from the North. And this is not to say that any 10 per cent of our ferns are of Northern origin. Of our 444 endemic species, presumably evolved locally from immigrant ancestors, only one-fiftieth are probably of ultimate Northern origin. Of all our species, only about 1 in 17 is of probable Northern origin or ancestry. If you will collect 100 species in a day, which is possible on Maquiling, and easy on Banajao, the chance is good that not one of them will represent the Northern component of our flora.

This Northern component is new here, as is shown by the local distribution of the species, almost all restricted to Northern Luzon, and by the extremely small number of endemics for which it is responsible.

Figures already presented show 57 of our non-endemics in common with New Guinea and only with New Guinea. The corresponding figure for Borneo is 139. If we could properly assume, as we have often done, that all common species are immigrants to the Philippines, it would follow obviously that Borneo has been a far more important source of our flora than New Guinea.

There are geographic grounds on which this had to be expected. Borneo is close to the Philippines, so near to the high island of Palawan, for the transmission of fern spores, they are almost in contact. Also, the small Bornean area which is far the richest in ferns, Mt. Kinabalu, is almost in sight of Palawan, and, as spores travel, is not remote from Mindanao.

In the other direction, Celebes is more remote, and New Guinea still more so. Also, we know nothing of the fern flora of Halmahera, and practically nothing of that of the Vogelkopf, the great North-Western extension of New Guinea. And Celebes is less well explored than Mindanao or Borneo, or even the highlands of New Guinea, but is believed to have a poorer fern flora, being drier. Imperfection of evidence of course impairs the force of our conclusions. As future collection will add more to our knowledge of the fern flora of New Guinea, Halmahera and Celebes than to that of Borneo, the disparity in the number of species of apparently South-Easterly and South-Westerly ferns will become less conspicuous. However, I do not expect it to disappear. Our mere contiguity to Borneo is reason enough to expect a great number of species in common.

However, our theme is the source of our flora. The number of species in common is important evidence, but evidence which is not to be accepted uncritically, as if it were conclusive. As the winds blow, I can hardly imagine the migration of a fern from Mindanao to New Guinea, but must believe that practically every species common to the two was an immigrant to Mindanao. On the other hand, as the winds blow, it seems to me that a Mindanao fern has been at least as likely to be carried to Borneo as a Borneo fern to be borne to Mindanao. This consideration alone may reduce to parity the probable receipt of immigrants from the two regions.

There is still another very important consideration. We will now recall the 236 species common to the Philippines, New Guinea and Malaya. Assuming with good reason that these did not originate in the Philippines, either they were first in

New Guinea and migrated to Malaya, or were first in Malaya and migrated to New Guinea. The latter alternative used to be accepted without question. To-day, since we have learned the richness of New Guinea in ferns, have more or less learned that the continental source of these ferns was not Asia but Antarctica, and have taken cognizance of the direction of the wind which bears the spores, there remains no evident ground for doubt that migration in the tropical Orient has been in general from East to West. Recognizing the fact that the bulk of the fern flora of Malaya,—of the 236 species common to Malaya, the Philippines and New Guinea, and also of the 139 species common to Malaya and the Philippines but not to New Guinea, along of course with the 57 species common to New Guinea and the Philippines only,—is of New Guinea origin, decision as to the origin of the 432 non-endemic Philippine ferns which did not come to Luzon from China is merely a question as to the route of migration,—whether directly from New Guinea to Mindanao, or indirectly, by way of Malaya, or in many cases by way of Borneo but not of Java.

Whatever the route, my conclusion is that about 90 per cent of our non-endemic species are of direct or indirect New Guinea origin.

So far, except for a note regarding our Chinese component, we have ignored the endemics, as if they were without interest in a discussion of origin, which is not the case. The difficulty with their use is that it involves the presentation and interpretation of details, and their full use would extend this short essay to a size more like that of a book. For one illustration: The genus *Haplodictyum* consists of two endemics, ranging from Samar to Cagayan. It is intimately related to a group of 14 endemic species of *Cyclosorus*, largely confined to the same humid East coast, and without known outside relatives except where the first of the group was described, in the Moluccas. Clearly enough, this little derived genus, and these other 14 endemic species, are here as a result of direct immigration from the region of New Guinea.

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A NEW SPECIES OF NEMATODIRUS (NEMATODA:
TRICHOSTRONGYLIDAE) FROM SHEEP

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and

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TWO PLATES

During a survey on the internal parasites of sheep at Sung San Tan, Kansu Province, North-western China, by one of us (B. Y. W.) in 1948, numerous specimens of a nematode belonging to the genus *Nematodirus* were recovered from three out of ten heads of sheep examined. They were fixed and stored in 70 per cent alcohol. Later, in winter of the same year, the specimens were mounted and studied in the laboratory of the Department of Parasitology, National Veterinary College, Lanchow, Kansu. The description given below is based on twenty-two specimens, ten female and twelve male.

NEMATODIRUS LONGISPICULARIS n. sp.

The body is thread-like and tapers toward the anterior portion, the extremity of which is inflated. The cuticle is marked with a varying number of longitudinal ridges. The perioral structure presents centrally a triradiate aperture, surrounded by three incompletely separated lips, each bearing two prominent round papillae.

Male: length 12.9 to 16.4 mm.; maximum width 0.12 to 0.16 mm. Oesophagus 0.47 to 0.6 mm. long by 0.02 to .022 mm. wide at anterior end, 0.034 to 0.045 mm. at nerve ring and 0.034 to 0.054 mm. at posterior end. Nerve ring 0.21 to 0.29 mm. from anterior end of oesophagus. The bursa is composed of a pair of lateral lobes, devoid of cuticular bosses, and a pair of dorsal lobes, marked off from the former by a slight indentation. The

arrangement of the rays is characteristic of the genus. Each of the dorsal rays is bifid distally, with the small outer branch curved laterally. The ventral rays are close together and parallel while the externo-dorsal rays are long and slender. The postero-lateral ray is close to the medio-lateral throughout its length, only diverging from it distally. The externo-lateral ray is widely separated from the medio-lateral at its distal third or half. Spicules are relatively very long and slender, united by a membrane except near their roots. They measure from 6.7 to 10.3 mm. long. The ratio of the length of body to that of spicule is 1: 0.4 to 0.7 with an average of 1: 0.56. The spicules terminate in a spoon-shaped expansion, similar to that of *Nematodirus spathiger* (Railliet, 1896).

Female: length 20.19 to 26.4 mm.; maximum width 0.27 to 0.33 mm. Oesophagus 0.44 to 0.62 mm. long by 0.02 to 0.025 mm. wide at anterior end, 0.036 to 0.047 mm. at nerve ring and 0.04 to 0.055 mm. at posterior end. Nerve ring 0.2 to 0.28 mm. from anterior end of oesophagus. Length of vagina 0.056 to 0.091 mm. Vulva to anterior end of body 5.5 to 9.66 mm. At the anterior lip of the vulva there is a prominent flap, attached to which is a thin membrane covering the genital opening. Tail 0.088 to 0.136 mm. long, somewhat truncate, with a slender terminal spike. Eggs relatively very large, measure 0.28 to 0.34 by 0.14 to 0.19 mm.

Host: *Ovis aries*.

Location: Small intestine.

Locality: Sung San Tan, Kansu Province, China.

Type specimen: NVC Helminthological Collection No. 431.

Discussion.—The present species may be differentiated from other members of the genus *Nematodirus* such as *N. spathiger* (Railliet, 1896) Railliet and Henry 1909, *N. filicollis* (Rudolphi, 1802) Ransom, 1907, *N. abnormalis* May, 1921, and *N. furcatus* May, 1921, mainly by its extremely long spicules, the absence of cuticular bosses on the male bursa as well as the presence of an anterior flap covering the vulva.

ACKNOWLEDGMENT

The authors are indebted to Dr. Marcos A. Tubangui of the Institute of Hygiene, University of the Philippines, Manila, Philippines, for his kind help in reading over the manuscript.

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- Ross, I. C. and H. MCL. GORDON. The Internal Parasites and Parasitic Diseases of Sheep. Sydney, Angus and Robertson Limited (1936) 238.

ILLUSTRATIONS

PLATE 1

- Fig. 1. Anterior end of female.
2. Ova.
3. Perioral structure.
4. Posterior end of female, showing terminal spike.
5. Lateral view of vulva, showing anterior flap and a thin membrane attached to it.

PLATE 2

- Fig. 1. Entire male, showing spicules.
2. Extremities of spicules.
 (a) Proximal ends.
 (b) Lateral view of distal ends.
 (c) Dorsal view of the same.
3. Dorsal view of bursa copulatrix.
4. Lateral view of the same.

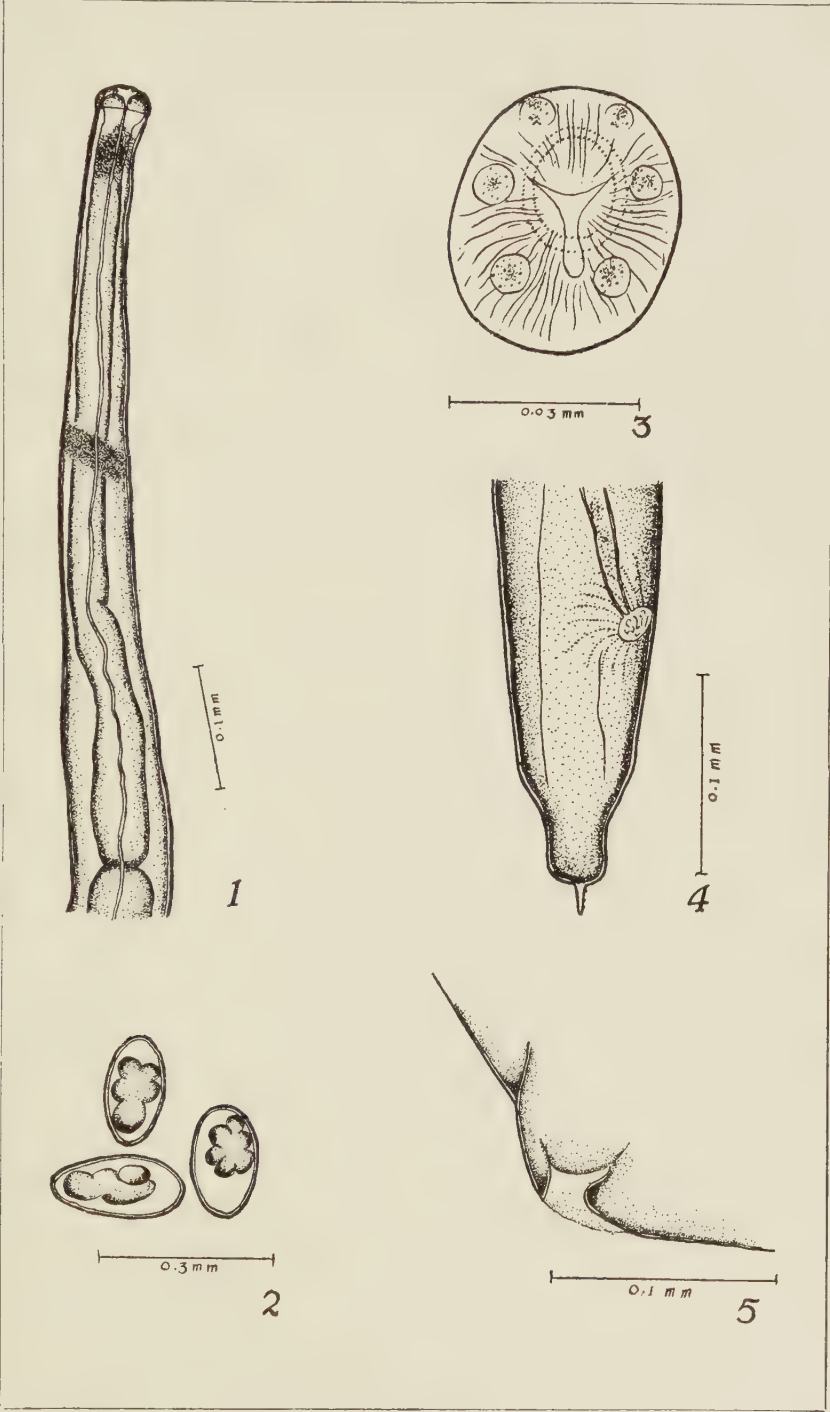


PLATE 1.

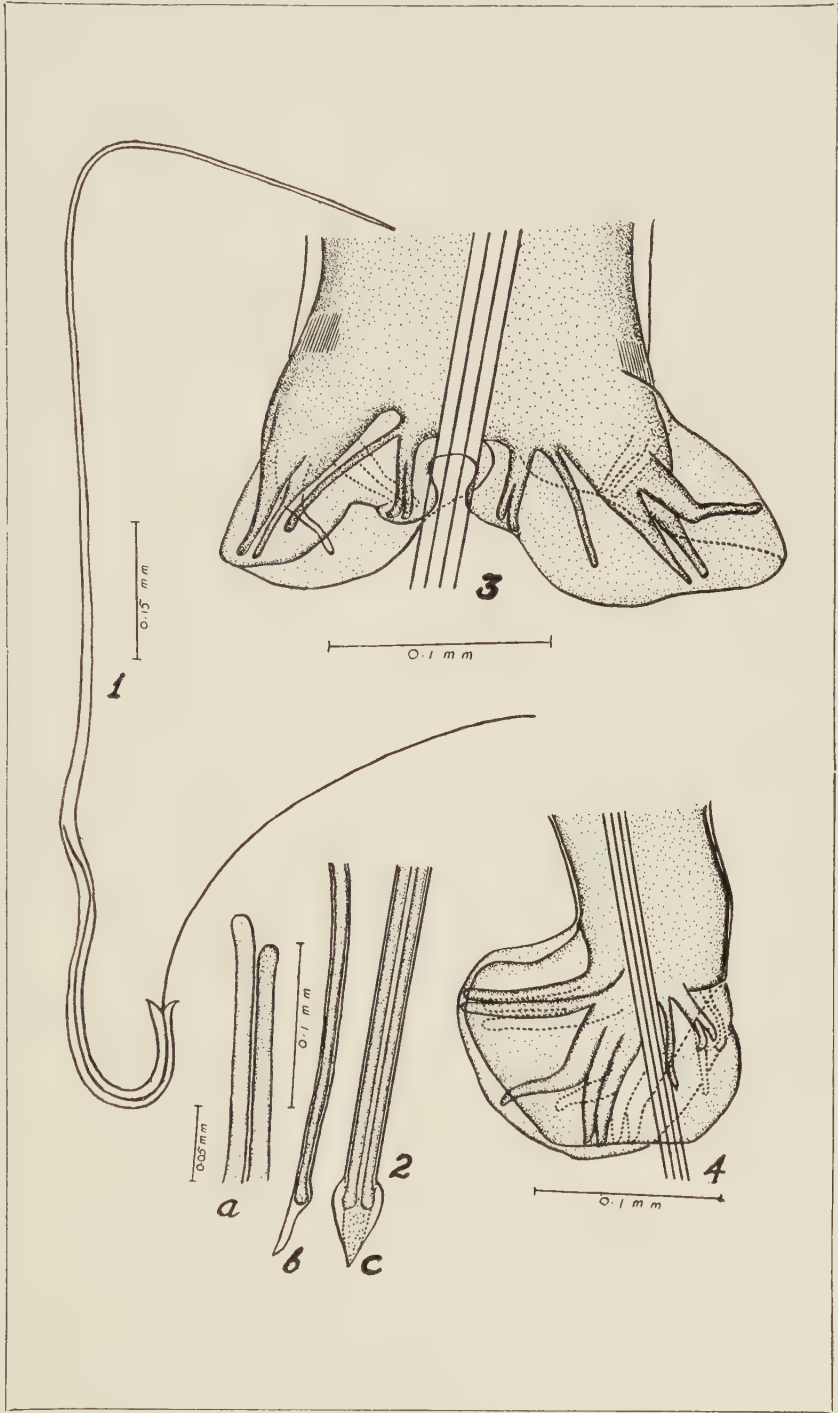


PLATE 2.

THE LAMIINE TRIBE GNOMINI (COLEOPTERA, CERAMBYCIDAE)

BY LAWRENCE S. DILLON AND ELIZABETH S. DILLON

Reading Public Museum, Reading, Pennsylvania

THREE PLATES

The Gnomini form a small tribe of longhorns confined entirely to the Indo-Australian faunistic region. While the species are comparatively few the individual members are frequently encountered and they compose a characteristic feature of the fauna of the area involved. Its components as a whole have never been the subject of a revisional study, although the species of the genus *Gnoma* were treated in recent years (Schwarzer, *Senckenbergiana*, VIII, p. 279-287, 1926) ¹

The present study is based primarily on the very large collection of the group contained in the United States National Museum, where the major portion of the types has been deposited. Supplementing these specimens were the collections of the following institutions and individuals: American Museum of Natural History [AMNH]; Australian Museum [AM]; Academy of Natural Sciences of Philadelphia [ANSP]; British Museum (Natural History) [BMNH]; California Academy of Sciences [CAS]; E. F. Gilmour, Huddersfield, England [EFG]; Lionel Lacey, New Rochelle, N. Y. [LL]; Museum of Comparative Zoology [MCZ]; Naturhistoriska Riksmuseum, Stockholm [NRS]; and Rijksmuseum van Natuurlijke Historie, Leiden [RNHL].

The authors' thanks are extended to the following persons for arranging for loans and for other favors: Dr. E. A. Chapin; Mr. Warren S. Fisher; Dr. Mont Cazier; Mr. E. T. Cresson, Jr.; Mr. James A. G. Rehn; Dr. H. E. Hinton; Mr. E. F. Gilmour; Dr. E. A. Ross; Dr. J. Linsley Gressitt; Mr. Lionel Lacey; Dr. P. J. Darlington, Jr.; Dr. René Malaise; Dr. C. de Jong; Dr. C. Blöte and Mr. Keith C. McKeown.

TRIBAL CHARACTERISTICS

Elongate-oblong, slender or moderately robust, cylindrical, moderate in size. Head distinctly wider than pronotum, not retractile; front transverse, sides parallel or narrowed below,

¹ Since this was written Mr. S. Breuning has published a review of the tribe in *Novitates Entomologicae*, suppl. 3, vol. 2.

convex; eyes deeply emarginate, lower lobe transverse; antennal tubercles prominent, obtusely armed at apex; antennæ usually longer in male than female, scape attaining apex of pronotum, clavate with a closed cicatrix at apex; the segments beyond, at least the seventh, strongly shortened. Pronotum elongate, usually extremely so in male; sides armed or unarmed. Elytra with prominent humeri; apices separately rounded; hind wings present. Proacetabula closed behind, angulated externally; mesacetabula open externally. Legs moderate or elongate, first part longest, middle shortest; procoxae large, globose; protibiae with a distinct spur near apex in male; tarsi rather long; claws divergent, simple. Abdomen with first sternite elongate, at least as long as next three together.

This tribe is extremely close in its structural characteristics to the Monochamini; the form of the pronotum, the protibial spur of the male, and the distal segments of antennæ suddenly decreasing in length are perhaps the sole distinguishing features.

The genus *Amphoecus* Montrouzier in no way can be placed in this tribe, and hence is omitted here.

Key to genera

- | | |
|--|--------------------|
| 1. Pronotum with a distinct tubercle on each side just behind middle | <i>Imantocera</i> |
| Pronotum unarmed | 2 |
| 2. Antennæ densely plumed on apices of third, fourth, and fifth segments | <i>Psectrocera</i> |
| Antennæ not plumed | <i>Gnoma</i> |

Genus IMANTOCERA Thomson

- Imantocera* Thomson, Arc. Ent. 1 (1857) 188; Class. Ceramb. (1860) 94, 102; Syst. Ceramb. (1864) 382. Lacordaire, Gen. Col. 9 (1869) 364. Breuning, Nov. Ent., Suppl. 3 2 (1945) 527.
Himantocera Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 288.

Moderate-sized beetles; oblong, cylindrical. Head with front transverse, sides parallel; genae subquadrate; eyes with lower lobe large, trapezoidal, subequal in length to gena; antennal tubercles prominent, well separated at base, with a feeble tooth at apex. Pronotum feebly elongate in male, transverse in female, base and apex subequal; sides with a tubercle at middle and another and smaller one below it; disk irregular. Scutellum transverse. Elytra wider at base than pronotum, feebly attenuate posteriorly in male, slightly expanded behind middle in

female; disk at base with a series of granules along the apex of a crest, rest of disk with well-spaced, moderate punctures. Prosternum simple; mesosternum with a feeble, obtuse tubercle. Legs feebly elongate, the middle ones shortest. Antennæ one and one-third to one and one-half times as long as body, shorter in female; scape attaining pronotal apex, robust, rugose above; third segment longer than fourth, the apices of third and fourth segments expanded and the inner angle prolonged, the fifth feebly so, densely plumed on apex of fourth.

Genotype.—Thomson included no species with his original description but in 1860 quoted *Imantocera plumosa* Hope? (*penicillata*? White) (*penicillata* Hope).

Key to species

- | | |
|--|--------------------|
| 1. Elytra with preapical macula as large as scutellum or larger | 2 |
| Elytra with preapical macula smaller than scutellum..... | 4 |
| 2. Scutellum pure white; elytra with gray pubescence pre-dominating | <i>sumbavana</i> |
| Scutellum yellowish-white or fulvescent; elytra with pre-dominating pubescence not gray | 3 |
| 3. Elytra with preapical macula distinctly larger than scutellum; antennæ with small tufts of hair on the eighth, ninth and tenth segments in male | <i>penicillata</i> |
| Elytra with preapical macula about equal in size to the scutellum; antennæ not tufted on distal segments in either sex | <i>grisea</i> |
| 4. Elytra without any gray pubescence | <i>niasensis</i> |
| Elytra with at least traces of gray pubescence | 5 |
| 5. Elytra very dark, with obscure, deep, broken reddish-ochraceous vittæ | <i>vicina</i> |
| Elytra paler, with broken vittæ more prominent, ochraceous | <i>plumosa</i> |

1. *IMANTOCERA SUMBAVANA* Breuning

Plate 3, fig. 3.

Imantocera sumbavana Breuning.

In the antennæ bearing tufts of hair on the apical segments, *sumbavana* resembles *penicillata* of the mainland; but in its smooth pronotal sculpturing it shows its relationship to the other insular forms. It is quite distinct from the latter in its coloration.

Male.—Robust; black, densely covered with chocolate-brown pubescence, mottled irregularly with fuscous on head and pronotum. Head with front sparsely varied with hoary gray and maculate with fulvous below. Pronotum on disk indistinctly variegated with dull fulvous; laterally with an irregular broad hoary vitta, in which is placed a narrow dull fulvous vitta; at base medially a small whitish macula. Scutellum entirely white. Elytra mottled about equally with hoary and light fulvous pu-

bescence (in the single female example which was studied, the latter is absent entirely and the hoary about equalled the chocolate-brown in quantity); before apex an oval, whitish and fulvous macula, larger than scutellum. Beneath piceous, largely hoary pubescent; prosternum, procoxæ, mesosternal side-pieces (these also variegated with dark brown and whitish), and a macula on sides of metasternum and another on metepisterna, fulvous; abdomen on each side with two series of maculæ, the inner fulvous, the outer whitish, becoming fulvous apically. Legs and antennæ dark reddish-brown, hoary pubescent; the latter with third to fifth segments dark apically, the sixth and following segments entirely pale.

Head impunctate except on antennal tubercles. Pronotum slightly longer than wide; apical and basal transverse sulci distinct; disk rather smooth, a low tubercle before basal sulcus on each side of middle, larger tubercle behind apical sulcus placed a little more laterally. Elytra finely, rather densely granulate-punctate on basal fifth, granules larger on crest, seriate, and extending to basal third, thence coarsely punctate to apex, punctures much finer behind apical third. Mesosternum anteriorly with a low rounded tubercle; fifth sternite at apex emarginate-truncate. Protibial spur long, acute. Antennæ one-third longer than body; scape attaining apex of pronotum, densely rugose above; third segment twice length of first, apically scarcely expanded internally, rather roughly punctate; fourth very little shorter than third, medially slightly thickened, then contracted and strongly reexpanded at apex, with a dense plume covering apical half of under surface; fifth segment longer than first, rest much shorter, all bearing small tufts of hair beneath at apex (except the last).

Female.—Like male but more robust; pronotum transverse; fifth sternite longer than third and fourth together, broadly truncate at apex; protibial spur feeble; antennæ as long as body, segments abruptly shorter beginning with fifth.

Length 17 to 22 millimeters; width 5.5 to 7.

Type in Naturhistorische Riksmuseum, Stockholm.

Type locality: Sumbawa.

Distribution: Sumbawa Island.

Sumbawa: ♂, ♀, no locality data [♂ (type)—NRS; ♀ —RN-HL], ♂ Haruhasa Mountain [EFG].

2. *IMANTOCERA PENICILLATA* Hope

Plate 3, fig. 2.

Lamia penicillata Hope, in Gray, Zool. Misc. 1 (1831) 17.

Imantocera penicillata Hope. Pascoe, Journ. Ent. 1 (1862) 345; Breuning, Nov. Ent., Suppl. 3 2 (1945) 527.

Himantocera penicillata Hope, Gahan, Ann. Mus. Civ. Genoa 34 (1895) 47.

Imantocera plumosa Thomson [non Olivier], Class. Ceramb. (1860) 102.

Imantocera olivieri Thomson, Syst. Ceramb. (1865) 555. New synonymy.

Imantocera arenosa Pascoe, Journ. Ent. 1 (1862) 344. New synonymy.

This species is exceedingly close to *vicina* but is constantly distinct in its paler coloration, the elytral pale apical macula larger than the scutellum, the antennæ in male with small tufts of hair on at least eighth to tenth segments, the fourth segment distinctly expanded medially in both sexes, and the abdomen usually with three series of maculæ each side.

Male.—Robust black, densely covered with fuscous pubescence, variegated with hoary pubescence on elytra and sides of pronotum, and mottled with deep fuscous. Head above variegated with fulvous, sometimes four or five maculæ paler and more distinct, front sparsely variegated with fulvous. Pronotum variegated with fulvous medially and on sides; each side of disk before middle with a single prominent fulvous macula; at base with three whitish marks, the middle one wide along margin, then constricted and sublinear as it extends cephalad, re-expanded anteriorly; each side of disk at middle a rather large pale macula, and another smaller on each median tubercle basally. Scutellum entirely yellowish-white. Elytra each with five distinct, much interrupted, ochraceous vittæ; before apex a prominent pale macula, usually distinctly larger than the scutellum. Body beneath, legs, and antennæ as in *vicina* but the abdomen with three series of maculæ instead of two on each side. Antennæ with fourth segment somewhat expanded at middle, then slightly constricted and strongly re-expanded at apex, with a dense plume covering the entire apical half beneath; the seventh to eleventh segments usually with a small, short tuft of hairs beneath, at least the eighth to tenth so tufted. Rest as in *vicina*.

Length 13 to 20 millimeters; with 4.5 to 6.

Type locality: Nepal (*penicillata*); Siam (*olivieri*); Cambodia (*arenosa*); Assam (*plumosa*).

Distribution: Southeastern Asia.

India: ♀, Dejo, Upper Assam, July 9, 1910 [BMNH]. 2 ♂, 4 ♀, Chandkiva, Silhet [EFG].

Burma: ♂, Taunggyi, Feb. 1927 [USNM].

Indo-China: ♂, Tonkin [LL] ♂, Choganh, Tonkin [USNM].

♂ Than-Moe, Tonkin [RNHL]. ♂, ♀, Hoo-Binh, Tonkin [USNM]. ♀, Annam [RNHL]. ♂, Phuc-Son, Annam [RNHL].

3. *IMANTOCERA VICINA* Gahan

Plate 3, fig. 4.

Himantocera vicina Gahan, Ann. Mus. Civ. Genoa 2 14 (1894) 47.

Imantocera vicina Gahan. Breuning, Nov. Ent., Suppl. 3 2 (1945) 527.

The very dark coloration (appearing nearly black) of the upper surface and the form of the fourth antennal segment will serve to distinguish this species.

Male.—Robust; black, densely covered with fuscous pubescence, sparsely variegated with hoary and mottled with black. Head above sparsely irrorate with fulvous, sometimes four maculae paler and more distinct; front varied with fulvous, especially on each side and at middle. Pronotum variegated with fulvous medially and on sides of disk; three whitish marks at base, lateral ones small, median one large, extending cephalad to sulcus in the form of a vitta which is of nearly uniform width throughout; on each side of disk at middle a rather large pale macula. Scutellum entirely whitish. Elytra each with five obscure, much interrupted, ochraceous vittae; before apex a small, whitish macula, about half as large as the scutellum. Body beneath black, fuscous pubescent; maculate with fulvous on sternal side-pieces, on sides of metasternum, and in two series on each side of abdominal sternites. Legs dark brown, fuscous pubescent; femora each with three hoary annuli; tarsi a little paler than tibiae (which are in turn paler than femora), whitish pubescent. Antennae dark reddish-brown, dull hoary pubescent, the apical segments often annulate with fuscous.

Head impunctate except on antennal tubercles. Pronotum slightly longer than wide; apical and basal transverse sulci distinct; disk roughly sculptured, an elongate tubercle on each side of middle, each broken into three parts, anteriolaterad of these a rounded tubercle and above lateral spines another less pronounced. Elytra with nearly entire basal quarter granulate, the granules on crest larger and denser, succeeded by coarse punctures posteriorly; crest variable, sometimes short, sometimes continued as a costa nearly to apex. Mesosternum with a prominent tubercle, distinctly produced cephalad; fifth sternite narrowly emarginate at apex. Protibial spur short, dentiform. Antennae distinctly longer than body; scape attaining apex of pronotum, densely rugose above, third segment twice length of

first, punctate above, internally at apex with a distinct process; fourth segment one-quarter shorter than third, at middle only feebly expanded if at all, the apex strongly so, the plume covering the apical half of under surface; fifth segment as long as first, expanded at apex, rest much shorter, without tufts.

Female.—Like male but more robust; pronotum transverse; fifth sternite longer than third and fourth together, broadly emarginate at apex; protibial spur very short; antennæ as long as body, segments abruptly shortened from fifth.

Length 13 to 18 millimeters; width 5 to 6.

Type in British Museum.

Type locality: Burma.

Distribution: Northern India.

India: 4 ♂, ♀, Gopaldhara, Rungbong Valley, Sikkim [BMNH]. 3 ♂ ♀, Pedong, Sikkim [RNHL]. 3 ♂, ♀, Guntok, Sikkim [RNHL]. 10 ♂, 8 ♀, Dejoo, Up. Assam [BMNH]. 5 ♂, Khasia Hills, Assam [EFG]. 2 ♂, ♀, N. Manipur [EFG]. 3 ♂, 2 ♀, Margherita, Assam [EFG].

4. *IMANTOCERA PLUMOSA PLUMOSA* OLIVIER

Plate 3, fig. 6.

Cerambyx plumosa Olivier, Encyc. Meth. Ins. 7 (1792) 463; Ent. 67 4 (1795) 98, pl. 20, f. 152.

Himantocera plumosa Olivier. Pascoe, Journ. Ent. 1 (1862) 345; Trans. Ent. Soc. Lond. 3 3 (1866) 288; Gahan, Ann. Mus. Civ. Genoa 2 14 (1895) 48.

Imantocera plumosa Olivier. Pascoe, Proc. Zool. Soc. Lond. (1866) 251; Breuning, Nov. Ent., Suppl. 3 2 (1745) 527.

Imantocera borneotica Breuning, Fol. Zool. Hydrobiol. 10 (1940) 414; Nov. Ent., suppl. 3 2 (1945) 528. New synonymy.

In this species there are three colors in the pubescence on the elytra, the fulvous appearing as rather small, seriate maculæ; the scutellum is fulvous or ochraceous pubescent, broadly margined with white or yellowish-white.

Male.—Robust; black, covered with mottled fuscous, grayish-white and fulvous pubescence. Pronotum with a broad, irregular, pale vitta over lateral tubercles consisting mostly of whitish pubescence with some fulvous and several smaller patches of fuscous pubescence intermingled. Scutellum ochraceous or fulvous pubescent, rather broadly margined with white or yellowish-white. Elytra with fulvous pubescence appearing as small, seriate maculæ; at apex a small, fulvous, oval macula placed obliquely. Beneath fuscous, thinly, sparsely, brown and gray pubescent with scattered, coarse, white hairs; laterally with small, fulvous maculæ, abdomen with double rows on each side. Legs piceous, mottled with fulvous, fuscous, and gray pubescence

and with scattered white hairs; femora annulate at apex with fuscous; metatibiæ with a fulvous macula near apex; tarsi and claw segment gray basally. Antennæ piceous, from sixth segment much paler, all segments broadly pale annulate at base.

Head with a few coarse punctures on vertex and base of antennal tubercles. Pronotum slightly elongate; basal sulcus deep; disk with anterior tubercles broad, rounded, with a broad, deep depression between them, the basal tubercles small. Elytra each with an arcuate row of transverse granules on basal quarter, the ridge distinct to middle and with coarse punctures; disk on basal quarter between granulated ridges with small, sparse granules, humeri and disk between ridges more coarsely and closely granulated, remainder of disk punctate, the punctures becoming finer apically. Mesosternum at base with a large, obtuse tubercle. Fifth sternite broadly obtuse at apex. Profemora at extreme base roughly rugose; protibial spur strong with a long robust tooth. Antennæ about one-third longer than body; scape attaining apex of pronotum, finely, densely punctate and with a few feeble rugosities; third segment slightly more than twice length of scape, slightly thickened internally at apex; fourth slightly shorter than third, expanded on apical third and with a long, thick process internally at apex, ventrally with a thick tuft of hairs on the expanded portion; fifth feebly tufted at apex; remaining segments much shorter; eleventh slightly longer than tenth, acuminate at apex.

Female.—More robust than male; pronotum transverse; protibial spur feeble; fifth sternite with apex broadly rounded; antennæ as long or very slightly shorter than body, eleventh segment only very slightly shorter than tenth.

Length 13.5 to 21 millimeters; width 4 to 6.5.

Type locality: East Indes (*plumosa*); Mahakin Riv., Borneo (*borneotica*).

Distribution: Sumatra and Borneo.

Sumatra: ♂, no locality data (Muller); [RNHL]. 10 ♂, 2 ♀, Tandjong Morawa Serdang (*B. Hangen*) [RNHL]. 15 ♂, 8 ♀, Muara Kiawai, June 1915 (*E. Jacobson*) [RNHL]. ♂, ♀, Manna (*M. Knappert*) [RNHL]. ♂, Palembang (*Keil*) [RNHL]. ♀, Sipirok [RNHL]. ♂, Lang Kat (*Dixon*) [RNHL].

Borneo: ♂, 2 ♀, no locality data [MCZ, RNHL]. 2 ♂, Brunei [USNM]. 5 ♂, Sandakan [USNM, RNHL]. ♂, Smitau [RNHL]. ♂, ♀, Ketoengan [RNHL]. 2 ♂, Pontianak [EFG]. 2 ♂, ♀, Bov. Kapoea [RNHL]. 2 ♂, Kinabalu [MCZ]. ♂, Balikpapan [RNHL]. ♂, ♀, Muara Kiawai,

April 1915 [RNHL]. 12 ♂, 9 ♀, Mahakkam [RNHL; NRS-Type of *borneotica*].

5. *IMANTOCERA PLUMOSA ACMOCEROIDES* Thomson

Plate 3, fig. 5.

Imantocera acmoceroides Thomson, Syst. Ceramb. (1865) 555.

Male.—Like Sumatran examples but distinct in having the colored markings on pronotum reddish-brown rather than fulvous and the disk more largely fuscous pubescent; and the elytra are heavily fuscous-mottled, so that very little hoary and fulvous pubescence is evident.

Length 16 millimeters; width 5.

Type locality: Malacca.

Distribution: Extreme southeastern Asia.

Siam: 2 ♂, Trong [USNM, CAS].

Malacca: ♂, no locality data [AMNH].

6. *IMANTOCERA NIASENSIS DEJONGI* subsp. nov.

Plate 3, fig. 8.

In the present form, the elytra are covered with pale fulvous pubescence, mottled with fuscous but without any ochraceous markings; the sixth to eleventh antennal segments are entirely pale pubescent; the mesosternum is armed with a tubercle which projects forward rather strongly; and the scutellum uniformly pale fulvous pubescent.

Male.—Robust, black, largely covered with pale fulvous pubescence, mottled with fuscous. Head mostly fuscous, on vertex with sparse, fulvous maculæ, a distinct linear macula on each side. Pronotum strongly fuscous-mottled medially and anteriorly, leaving the fulvous area above the spines and latero-basally nearly free of dark spots. Scutellum uniformly pale fulvous pubescent. Elytra entirely pale fulvous pubescent, with fuscous and glabrous mottling, sometimes irregularly tinged with deeper fulvous; a small pale macula often present before apex. Body beneath fuscous; laterally pale fulvous pubescent, on abdomen forming two rows of maculæ on each side. Legs fuscous, indistinctly banded with fuscous and hoary pubescence. Antennæ fuscous, pale pubescent briefly beyond middle of third segment, on base of fourth, basal three-quarters of fifth, and entirely covering the succeeding segments.

Head impunctate except on antennal tubercles. Pronotum slightly longer than side at base; basal transverse sulcus distinct; disk with a median longitudinal impression and a rather deep fovea before it, the two anterior tubercles distinct, the posterior pair usually not abrupt behind. Elytra each with a single row of granules extending no further than basal third,

the ridge almost completely evanescent shortly behind middle, and with a few fine granules near humeri, the punctation fine and sparse, more or less seriate, becoming even finer and sparser posteriorly. Mesosternum with a prominent tubercle, distinctly projecting cephalad. Fifth sternite feebly emarginate at apex. Protibial spur rather long, slender. Antennæ distinctly longer than body; scape just attaining apex of pronotum, rather rugose above; third segment twice length of first, somewhat thickened internally at apex, sparsely punctate above; fourth nearly as long as third, expanded gradually to apical third, then slightly constricted and strongly reexpanded, especially internally where there is a thick process, the plume dense and long, occupying entire apical half of the under surface; fifth as long as first, the rest much shorter.

Female.—Like male, but more robust; pronotum distinctly transverse; protibial spur short, obtuse; fifth sternite longer than third and fourth together, apex broadly retuse; antennæ as long as body, fifth segment distinctly shorter than first.

Length 19 to 23 millimeters; width 6 to 7.2.

Type, allotype, and paratype in Rijksmuseum van Natuurlijke Historie, Leyden.

Type locality: Tappanoely, Sumatra.

The type male, allotype female, and three paratypes are from the type locality. Three additional paratypes are from Solok, Padang, Sumatra. Named for Dr. C. de Jong, of the Leyden Museum, in acknowledgment of numerous favors received.

7. *IMANTOCERA NIASENSIS* Breuning

Plate 3, fig. 7.

Imantocera niasensis Breuning, Festschrift E. Strand (1936) 304; Nov. Ent., Suppl. 3 2 (1945) 528.

Very similar to the foregoing but constantly differing as follows: Elytra with the granules on and near the humeri larger and denser; the antennæ with the plume covering more than the apical half of the fourth segment, i. e., extending proximad of the middle; and the elytra more heavily mottled with fuscous. In addition, the elytral pubescence frequently is whitish or very pale, but this character varies.

Length 14 to 22 millimeters; with 4.5 to 7.4.

Type locality: Nias Island.

Distribution: Nias Island.

Nias: 15 ♂, 12 ♀, no locality data (*J. D. Pasteur*) [RNHL]. 3 ♂, 2 ♀, Dyma, March to May, 1895 (*R. Mitschke*) [USNM, LL]. 2 ♂, Kalim Bungo [USNM]. ♂, 2 ♀, Goenoeng Sitoli [MCZ].

3. *IMANTOCERA* *GRISESCENS* sp. nov.

Plate 3, fig. 9.

Male.—Robust, fuscous; entirely covered with mottled gray, pale fulvous, and dark brown or fuscous pubescence, the latter in much smaller quantity than the first two. Pronotum with a broad, pale vitta over lateral tubercles. Scutellum fulvous, margined with white, or entirely fulvous or yellowish-white. Elytra with fulvous pubescence arranged in four or five narrow vittæ; at apex a small, pale, oval macula which is oblique. Beneath piceous, grayish-brown pubescent, with coarse, scattered, white hairs, laterally a row of fulvous maculæ, a double row on abdominal sternites. Legs piceous, grayish pubescent, with coarse, scattered, white hairs; femora annulate apically with dark brown; meso- and metatibiæ with a pale macula medially on dorsal side; tarsi paler and with gray and fulvous pubescence. Antennæ piceous, from fifth segment paler; scape thinly brown and gray pubescent; from third all with basal two-thirds gray annulate, apices dark.

Head impunctate except for a few coarse punctures on base of antennal tubercles. Pronotum feebly elongate; apical discal tubercles with a deep, curved sulcus before and behind at middle of pronotum. Elytra at middle of base each with a feebly arcuate, granulate ridge on basal third, the granules being in a single row and somewhat squamose and transverse; the ridge continued to middle or slightly beyond, the granules replaced by coarse punctures; extreme base between ridges with fine, sparse granules, humeri and surface to ridge with coarser granules; remainder of disk with coarse punctures, the punctures becoming slightly finer apically. Mesosternum at base with a very large tubercle which is either right angled or projecting anteriorly. Fifth sternite broadly retuse. Profemora at extreme base roughly rugose; protibial spur moderate, apex blunt; protarsi broadly dilated and heavily fringed. Antennæ about one and one-third times body length; scape attaining apex of pronotum, surface scabrose; third segment slightly more than twice length of scape, shortly produced at apex on inner side; fourth widened beyond middle and strongly produced at apex on inner side, heavily tufted on apical third; eleventh longer than tenth, acuminate apically.

Female.—Like male, but more robust; pronotum transverse; profemora not rugose basally; protibial spur obtuse; protarsi feebly dilated; antennæ as long as or slightly shorter than body; fifth sternite at apex broadly emarginate.

Length 15 to 23 millimeters; width 4.5 to 7.

Type locality: Senggoro Mountains of Res. Passoeroean, Java. Holotype, allotype, and paratypes in U.S. National Museum.

The type male, allotype female, and two paratypes are from the type locality, where they were collected in 1899 by A. Koller. Additional paratypes are as follows: One female, collected at Palabuan by Fruhstorfer in the National Museum, two females from Malang in the E. F. Gilmour collection; one female from Ardjoeno, in the Leyden Museum; seven specimens from Montes Tenggers, 4,000 ft., in the Museum of Comparative Zoology and the Leyden Museum, and seven others in the last two museums and in the National collection, labelled simply "Java".

Genus PSECTROCERA Pascoe

Psectrocera Pascoe, Journ. Ent. 1 (1862) 345; Thomson Syst. Ceramb. (1864) 382; Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 260, 310; Lacordaire, Gen. Col. 9 (1869) 364, 365.

Moderate-sized beetles; elongate-oblong, cylindrical. Head with front transverse, slightly narrowed below, convex; genæ transverse; eye with lower lobe large, broadly ovate, slightly longer than gena; antennal tubercles prominent, subapproximate at base, broadly divergent apically, armed with a short tooth. Pronotum moderately elongate in male, less strongly so in female; sides not constricted medially; sides unarmed; disk feebly transversely rugose medially. Scutellum as wide as long. Elytra wider at base than pronotum, male attenuate apically, female slightly expanded behind middle; apices separately rounded; base with a series of granules along apex of a low crest, rest of disk more or less seriatly punctate. Prosternum simple; mesosternum with a large, right angular tubercle. Legs elongate, especially the forelegs, middle ones shortest. Antennæ nearly twice as long as body in male, slightly longer than body in female; scape attaining pronotal apex, robust, clavate, rather finely punctate above; third segment subequal in length to fourth, apices of both segments somewhat dilated, heavily tufted at apices; tufted also (in lesser degrees) on apices of fifth, eighth, ninth, and tenth.

Genotype.—*Gnoma* (?) *plumigera* Westwood, by original designation.

The tufted antennæ and unarmed pronotum will distinguish this genus.

1. PSECTROCERA PLUMIGERA Westwood

Plate 3, fig. 10.

Gnoma? *plumigera* Westwood, Cab. Orient. Ent. (1848) 11, pl. 5, fig. 3.

Psectrocera plumosa Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 311; Heyme-Taschenberg, Exot. Käfer (1904) 242, pl. 35, fig. 2.

Male.—Elongate, rather slender, dark reddish-brown to piceous, dark brown pubescent. Head with five, narrow, pale to deep fulvous vittæ, one medially, very narrow, one on either side of middle, and one behind lower lobe of eye; front margined laterally, and variegate medially with same pubescence. Pronotum with nine vittæ, one medially, white or yellowish-white, one on either side of middle, one laterally and two above procoxæ, the rest of these all pale to deep fulvous. Scutellum densely white or yellowish-white tomentose. Elytra with a broad, common, white or yellowish-white sutural vitta to basal third, which becomes narrower and oblique, then curves to suture behind middle and continues to apex where it is more or less broken and irregular; each disk with several, indistinct, pale to deep fulvous vittæ which are somewhat irregular and sometimes connected. Beneath reddish-brown to piceous, brownish-ochraceous pubescent, laterally narrowly vittate with yellowish-white pubescence; a small, narrower vitta on metasternum laterally. Legs and antennæ reddish-brown, yellowish-brown pubescent, segments broadly pale annulate, only extreme apices darker; from sixth, segments entirely pale.

Head above finely alutaceous; front with coarse, deep punctures at base of antennal tubercles. Pronotum slightly more than one and one-half times as long as wide; apical sulcus narrow, strongly curved medially, basal one feebly curved medially; disk sparsely feebly rugose. Elytra strongly attenuate to apices which are each narrowly rounded; at base each elytron with a feeble, arcuate, elongate ridge studded at its apex with moderate-sized granules (these sometimes squamose), extreme base with a few granules, thence to middle with coarse, rather sparse punctures; beyond the granulate ridge is a row of deep, coarse punctures continued to apical quarter, remainder of apical half with sparse punctures somewhat seriatly arranged. Mesosternum at base with a large, rounded tubercle, process subtruncate at apex. Metasternum with a longitudinal sulcus medially on anterior portion. Fifth sternite at apex broadly obtuse. Profemora narrowly rugose ventrally; protibial spur feeble, obtuse; protarsi dilated and fringed. Antennæ one and one-half to nearly twice body length; scape attaining apex of pronotum, very finely densely punctate, with a few larger scattered punctures; third segment slightly more than twice length of scape, heavily tufted on apical third, fourth and fifth less heavily tufted at apex; seventh, ninth, and tenth feebly tufted apically; eleventh longer than tenth, appendiculate at apex.

Female.—In color and markings same as male. Slightly more robust; pronotum feebly elongate; tubercle on mesosternum much smaller; profemora not rugose, protibial spur lacking; protibiae not fringed; antennae about one and one-third times body length, fifth segment feebly tufted, not tufted on seventh, ninth, and tenth.

Length 16.5 to 28 millimeters; width 4.5 to 7.

Type locality: Java.

Distribution: Java, Borneo, Sumatra, New Guinea.

New Guinea: ♂, Astrolabe Bay (*Rhode*) [USNM].

Borneo: 2 ♂, no locality data [RNHL]. ♀, Balikpapan, July 8, 1912 [RNHL]. ♂, Koetec [*C. Bork*] (RNHL).

Sumatra: ♂, 2 ♀, no locality data [RNHL]. ♂, Muara, Kiawai, June 1945 (*E. Jacobson*) [RNHL]. ♂, Manna (*M. Knappert*) [RNHL].

Java: 7 ♂, 2 ♀, no locality data [RNHL.-♀; MCZ-4 ♂, ♀; USNM-3 ♂]. ♂, ♀, Malang, 2nd Mt. (*A. Koller*) [RNHL]. 4 ♂, 2 ♀, Preanger (*P. F. Sijthoff*) [RNHL]. 3 ♂, ♀ G. Tangkoeban Prahoe, 4,000–5,000 ft., Preanger, Jan. 10–15, 1935 (*F. C. Drescher*) [LL]. ♂, ♀ Bandung, Preanger; (*Sijthoff*) [RNHL]. 2 ♂, ♀ Teogoe (*L. D. Pasteur*) [RNHL].

Some specimens have the markings entirely white or grayish-white instead of fulvous.

Genus GNOMA Fabricius

Gnoma Fabricius, Syst. Eleuth. 2 (1801) 315; Latreille, Regne Anim. Ins. 3 (1817) 314; ed. 2 5 (1829) 126; ed. Masson, Ins. 1 (1849) 490; Serville, Enc. Meth. Ins. 10 (1825) 337; Ann. Soc. Ent. France 4 (1835) 71; Castelnau, Hist. Nat. Col. 2 (1840) 480; Blanchard, Hist. Nat. Ins. 2 (1845) 159; Voy. Pole Sud, Zool. 4 (1853) 269; Thomson, Class. Ceramb. (1860) 104; Syst. Ceramb. (1864) 382; Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 311; Lacordaire, Gen. Col. 9 (1869) 366; Schwarzer, Senckenbergiana 8 (1926) 279; Breuning, Nov. Ent., Suppl. 3 2 (1945) 529.

Moderate to large-sized beetles; elongate-oblong, cylindrical. Head with front transverse, feebly convex, widened below; genae transverse; eyes with lower lobe large, broadly ovate, slightly longer than gena; antennal tubercles strongly prominent, subapproximate at base, widely divergent above, armed with a short obtuse tooth at apex. Pronotum very elongate in male, less so in female, strongly constricted medially in male, at base wider than at apex; sides unarmed; entire surface multicarinate, in female carinae often interrupted medially. Scutellum transverse. Elytra wider at base than pronotum, in male gradually attenuate posteriorly; in female slightly expanded behind mid-

dle; apices separately narrowly rounded; behind scutellum along suture a broadly triangular impression; disk at base granulate; humeri prominent, more or less right angular, the angle simply rounded. Prosternum simple; mesosternum sometimes tuberculate anteriorly. Legs elongate, especially the forelegs, longer in male, the middle ones shortest in female. Antennæ one and one-half or more times as long as body in male, in female one and one-fourth to one and one-half times body length; scape rather short, attaining pronotal apex, clavate and cicatriced apically, punctate or scabrose above; third segment straight, elongate, longer than fourth.

Genotype.—*Cerambyx longicollis* Fabricius, designated by Thomson, 1864.

Key to species

1. Elytra with a sutural vitta continuing from scutellum to apex; sometimes composed of minute maculæ or briefly interrupted behind middle 2
Elytra with sutural vitta absent or confined to basal half or less 6
2. Elytra with sutural vitta solid 3
Elytra with sutural vitta composed of minute maculæ 5
3. Elytra shining black (Celebes and the Moluccas) *agroides*
Elytra covered with brown tomentum 4
4. Elytra with a fine transverse line medially (New Guinea) *gelvinka* ♂
Elytra without a transverse line medially (Philippines) *suturifera*
5. Elytra at middle with a narrow, transverse fascia of minute maculæ (Celebes and other southern islands) *pulverea*
Elytra at middle with a broad, more or less diamond-shaped, common macula, composed of reticular tomentum (Philippines) *luzonica*
6. Elytra with a sutural vitta on basal portion 7
Elytra with sutural vitta absent 9
7. Elytra with a narrow, linear fascia medially; pronotal median vitta prominent, of equal width throughout (Philippines and Borneo) *vittaticollis*
Elytra with median fascia not linear; pronotal median vitta indistinct, attenuate apically (New Guinea) 8
8. Elytra on apical quarter minutely irrorate with white *boisduvali* ♀
Elytra at apex with a small, oblique, white macula *affinis* ♀
9. Elytra with a distinct, linear, transverse, median fascia 10
Elytra without a distinct, linear, transverse, median fascia 11
10. Elytral median fascia within a wide brown band; on apical and basal portions of elytra with minute ochraceous reticulations (Philippines) *jugalis*
Elytra only with a median, interrupted, white fascia, disk with a metallic reflex (Moluccas and New Guinea) *zonaria* ♀
11. Elytra black, shining, without any markings, usually with a metallic reflex (Moluccas and New Guinea) *zonaria* ♂

- Elytra not so 12
12. Elytra medially with a single, large, white macula (New Guinea) *affinis* ♂
- Elytra not so 13
13. Elytra covered with mottled brown pubescence, without any pale maculations 14
- Elytra with pale markings 15
14. Mesosternal tubercle very prominent, strongly elevated, somewhat recurved at apex (Admiralty Islands) *uniformis* ♂
- Mesosternal tubercle obtuse, not very prominent (Admiralty Islands) *admirala* ♂
15. Elytra brown pubescent, with an indistinct median pale fascia (Admiralty Islands) *uniformis* ♀
- Elytra not so 16
16. Elytra with a broad area of dense white tomentum on anterior half 17
- Elytra without an area of dense white tomentum 18
17. Elytra basal white area in the form of broad, common triangle, with its apex behind scutellum, not intermixed with ochraceous *gelvinka* ♀
- Elytra basal white area not triangular in shape, behind humeri and at base intermixed with ochraceous *admirala* ♀
18. Elytra surface color black, the white pubescence in a form of a median band, widening towards suture, and an area on apical quarter, the band and area made up of fine reticulations *boisduvali* ♂
- Elytral surface color fuscous or brown, white or pale markings otherwise 19
19. Front devoid of punctures except near antennal tubercles. *sublaevifrons*
- Front punctate 20
20. Elytra sparsely sprinkled with minute whistle guttules *thomsoni*
- Elytra not so 21
21. Elytra with the maculation finely reticular, rather sparse, nearly white in color, basal granules coarse; rather squamiform; mesosternum with the tubercles placed more cephalad; antennæ in male without a hair pencil; body form very elongate *sticticollis*
- Elytra with maculation coarse and dense, often fulvous or ochraceous, basal granules moderate, separated, usually not squamiform; body form more robust 22
22. Front more densely punctate; body length small, 13 to 18 millimeters; antennæ in male sparsely fringed beneath to fourth segment, bearing a fine hair pencil on apex of seventh segment *gilmouri*
- Front rather sparsely punctate; body longer, 13 to 28 millimeters; antennæ in male rather densely fringed beneath to sixth or seventh segment, without trace of hair pencil *longicollis*

1. GNOMA ZONARIA Linné.

Plate II, figs. 1, 2.

Cerambyx zonarius Linné, Syst. Nat., ed. 10 (1758) 394.*Gnoma zonaria* Linné. Schwarzer, Senckenbergiana 8 (1926) 284, pl. 4, figs. 20, 21; Breuning, Nov. Ent., Suppl. 3 1 (1945) 532.

Cerambyx giraffa Schreibers, Trans. Linn. Soc. Lond. (1801) 198, pl. 21, fig. 8.

Gnoma antilope Boisduval, Voy. Astrolabe, Ins. 2 (1835) 508.

Gnoma giraffa Schreibers. Donovan, Ins. New Holl. (1805) pl. 5, fig. 1; Guérin, Voy. Coquille Ins., Col. (1831) pl. 7, fig. 11; Zool. 2 (1838) 135; Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 312; Bates, Proc. Zool. Soc. Lond. (1877) 158.

Male.—Slender; entirely black or piceous, rather shining, with a greenish or purplish reflex, covered very sparsely with fine, brown pubescence. Scutellum densely white tomentose. Beneath legs and antennæ with sparse, fine, gray pubescence, which is somewhat denser on tibiæ.

Head above minutely alutaceous, with coarse, deep punctures which are well separated; front as above but the coarse punctures denser on antennal tubercles, forming rugosities. Pronotum about two and one-half times as long as wide; regularly, transversely multicarinulate, at base a few irregular and interrupted at middle. Elytra with sides broadly arcuate, apices each rather narrowly rounded; basal quarter rugosely granulate-punctate, thence to middle with coarse, well-spaced punctures, behind middle punctures finer, obsolete apically. Mesosternum basally with a large, well-elevated, rounded tubercle which is rugose basally, disk of process more or less transversely rugose, apex narrowly rounded; anterior process of metasternum with either a triangular fovea at base or a transverse sulcus; fifth sternite moderately emarginate at apex. Profemora rugose ventrally; protibiae ventrally serrate, spur strong and acute; protarsi dilated and fringed. Antennæ one and three-quarters to two times body length; scape attaining apex of pronotum, surface scabrose; third segment about three times length of scape, scabrose on basal two-thirds, fourth to ninth gradually shorter, tenth suddenly shorter, eleventh much longer than tenth and acuminate at tip; scape and third feebly fimbriate ventrally.

Female.—Body pubescence slightly denser; pronotum with a narrow median vitta, sometimes much interrupted, basal and apical quarters of elytra with fine, sparse, white maculæ, at middle with a narrow, transverse, white fascia with the anterior and posterior edges irregular; sometimes mesosternal side-pieces with a small, white macula; antennal segments from fourth heavily annulate on at least basal halves with gray. More robust; pronotum elongate; fifth sternite subtruncate apically; profemora not rugose, protibiæ lacking spur, protarsi slightly dilated, not fringed; antennæ one and one-third to one and one-

half times the length of body; third segment a little over twice length of scape.

Length 15 to 33 millimeters; width 3.7 to 7.

Type locality: "America" (*zonaria*); New Guinea (*antelope*).

Distribution: Moluccas, New Guinea, and Bismarck Archipelago.

Ceram: 7 ♂, 7 ♀, no locality data [MCZ, RNHL, USNM, EFG].

6 ♂, 3 ♀, Wahaai [MCZ, RNHL]. 10 ♂, 7 ♀, Kairatu,

February-March, 1892 [ANSP, USNM].

Amboina: 30 ♂, 15 ♀, [MCZ, RNHL, USNM].

Aru: ♂, 2 ♀, [RNHL].

New Guinea: 5 ♂, 4 ♀, no locality data [MCZ, RNHL].

New Britain: 2 ♀, no locality data [AM].

New Ireland: ♂ [EFG].

1a. *GNOMA ZONARIA* var. *ALBONARIA* Breuning

Gnoma zonaria var. *albovaria* Breuning, Nov. Ent., Suppl. 3 2 (1945) 532.

Breuning states that this form has the "elytra very densely varied with white on basal quarter and on apical quarter."

Type locality: Telesca, New Britain.

The two specimens listed above were typical *zonaria* in all respects; Breuning likewise lists *zonaria* from New Britain. It may be that this "variety" deserves full specific (or full synonymic) status.

2. *GNOMA AFFINIS AFFINIS* Guéron.

Plate 1, figs. 3, 4.

Gnoma longicollis Olivier (non Fabricius), Ent. 67 4 (1795) 49, pl. 11, fig. 73; Boisduval, Voy. Astrolabe, Ins. 2 (1835) 509.

Gnoma affinis Guérin, Voy. Coquille, Zool. Atlas, Ins. (1831) t. 7, fig. 18; Texte Zool. 2 2 (1838) 136; Boisduval, Voy. Astrolabe, Ins. 2 (1835) 539; Schwarzer, Senckenbergiana 8 (1926) 284, pl. 4, figs. 24, 25; Breuning, Nov. Ent., Suppl. 3 2 (1945) 534.

Gnoma ctenostomoides Thomson, Class. Ceramby. (1860) 105; Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 313.

Male.—Rather slender, black, pronotum sometimes piceous, shining, sometimes with a violet reflex. Pronotum on basal fifth with a short, yellowish-white vitta which is strongly narrowed apically. Scutellum densely white tomentose. Elytra at middle with a small, irregular, white macula, which is sometimes broken into several small ones; at apex with a narrow, oblique macula of same color, variable in length and width; base at humerus with a small, white macula. Beneath piceous, thinly, finely, pale gray pubescent; mesosternal side-pieces with dense, white pubescence. Antennæ and legs piceous, thinly, finely, gray pubescent.

Head above finely, alutaceous, with a few, coarse, rather deep punctures on vertex; front same as head above but the punctures more numerous, more shallow and very dense on the bases of the antennal tubercles. Pronotum slightly more than twice as long as wide, regularly, transversely carinate. Elytra gradually attenuate to apices, which are separately, narrowly rounded; basal quarter densely granulate to middle punctate, the punctures just before middle small and scattered, beyond middle the punctures entirely absent. Mesosternal process with a strong, obtuse tubercle at base; fifth sternite at apex broadly retuse. Profemora strongly rugose ventrally; protibiæ serrate ventrally, spine long and acute, feebly arcuate; protarsi dilated and fringed. Antennæ about twice body length; scape attaining apex of pronotum, surface roughly scabrose; third segment nearly thrice length of scape, roughly rugose on basal half, more finely so and densely, finely punctuate on apical half; fourth slightly longer than fifth; eleventh longer than tenth, acuminate at tip.

Female.—Dark, brown pubescent with a stronger violet reflex, head above with an indistinct, irregular, ochraceous vitta on either side of middle, front laterally and with a few maculæ on middle and eyes margined with same color; pronotum with five whitish vittæ, one at middle, one laterally, one above procoxae, the latter tinged with ochraceous at base; scutellum pale tawny or yellowish-white; elytra with a short, whitish, sutural vitta (narrower at base), which joins a triangular fascia at middle, the fascia much broken and irregular, sometimes only a single, small triangle of whitish pubescence remaining, laterally with minute, white maculæ irregularly placed, at apex with a few more minute, whitish maculæ besides the oblique one; the maculation on sterna ochraceous as well as that laterally on sternites; antennæ broadly annulate with gray; femora and tibiæ dorsally tinged with ochraceous. More robust; pronotum slightly longer than wide, carinæ rather regular; elytra slightly widened behind middle; mesosternal tubercle less strongly produced; fifth sternite broadly emarginate at apex.

Length 14.3 to 26 millimeters; width 2.7 to 5.7.

Type locality: New Guinea.

Distribution: Dutch New Guinea.

Dutch New Guinea: 5 ♂, 2 ♀, no locality data [ANSP, AMNH, RNHL, MCZ]. 5 ♂, 6 ♀, Fakfak [EFG, RNHL]. 8 ♂, ♀, Manokwari [MCZ]. 7 ♂, 7 ♀, Andai [USNM, EFG, RNHL]. 3 ♂, 2 ♀, Aiman, October. 11, 1933 [LL]. ♂,

Wandsei [EFG]. 2 ♂, ♀, Wasian, September 15, 1939 [LL]. ♀, Fakar (*Fruhstorfer*) [USNM]. ♂, Doreh 1875 [USNM]. ♀, Geelwink Baai [RNHL]. ♂, ♀, Mar Village, West Vogel kop, November-December (*Mallory*) [AMNH]. 2 ♂, Arfak Mountains [EFG]. 5 ♂, ♀, Sekroe [RHNL]. Salwatti Island: 7 ♂, 6 ♀, no locality data [RNHL]. Waigeu: ♂, no locality data [MCZ]. Misool: 2 ♂, no locality data [MCZ, RNHL].

3. *GNOMA AFFINIS BLANCHARDI* Breuning.

Plate 1, figs. 5, 6.

Gnoma albotessellata Schwarzer [non Boisduval], Senckenbergiana, 8 (1926) 285, pl. 4, figs. 28, 29.

Gnoma blanchardi Breuning, Nov. Ent., Suppl. 3 2 (1945) 332.

Male.—Differs from the nymotypic form in having a rather dense, dark brown pubescence above, the median macula of the elytra much larger and with a more pronounced metallic reflex; the elytra are also coarsely punctate to middle. In the female there is a rather distinct, narrow, short, white vitta from humerus, and the median fascia is more solidly white tomentose, less broken into finer maculæ.

Length 9.5 to 23 millimeters; width 3.5 to 6.

Distribution: Eastern New Guinea.

New Guinea: 11 ♂, no locality data [AM, AMNH, MCZ, USNM]. ♂, Bolan Gbg. [MCZ]. ♂, Roon [ANSP]. ♀, Andai [RNHL]. 2 ♂, 3 ♀, Owgarra, (Meek) [EFG]. 2 ♂, 2 ♀, Rossel Island [EFG].

Papua: 7 ♂, 6 ♀, Milne Bay [ANSP, USNM, MCZ, EFG, AM, AMNH]. 3 ♂, 2 ♀, Palmer River, June 7-14, 1936 [AMNH]. ♂, ♀, Fly River, 5 m. below Palmer River, May 23-31, 1936 [AMNH]. 2 ♂, ♀, Aitape, December 1944, (Enns) [LL]. ♀, Samasi, July 10, 1939 (Wind) [LL]. ♂, Iglubirei, 1890 [USNM]. ♂, 5 ♀, Yule Island [USNM, AM, ANSP]. ♂, Aligaba Creek [USNM]. Dutch New Guinea: ♂, Upper Setekwa River, Snow Mountains, 2,000-3,000 ft. [EFG]. ♂, Aiman, October 11, 1939 [LL].

New Ireland: ♂, Tanga 1933, (Bell) [AM].

Aru Island: 8 ♂, 17 ♀, no locality data [BMNH, USNM, AMNH, ANSP, MCZ, RNHL].

The specimens from the Rossel Islands have the punctures on the basal half of the elytra slightly finer than those of the others included here, but since the difference is so slight it was thought best not to separate them. The males of this subspecies may have the dark brown body tomentum nearly entirely lacking, and be shining as in the nymotype.

4. GNOMA AUSTRALIS Schwarzer

Gnoma australis Schwarzer, Senckenbergiana 8 (1926) 286. pl. 4, figs. 26, 27; Breuning, Nov. Ent., Suppl. 3 2 (1945) 534.

"Piceous, shining; front and vertex with a fine median line, finely punctate; antennal tubercles shining and more densely punctate. Antennæ in ♂ more than twice length of body, in ♀ about one and one-half times as long. Scutellum somewhat broader than long, entirely rounded, densely white tomentose. In ♂ pronotum 10 mm. long, elytra 13, in ♀ 7 mm. and elytra 15, hence the ♀ appears relatively broader than ♂, in both sexes the greatest narrowing is behind the middle. Elytra in ♂ only moderately narrowed posteriorly, in ♀ parallel to behind middle; basal quarter granulate, thence to dorsal macula punctate, thence very finely so to apex. Vittæ lacking in both sexes, only at base of pronotum is a keil-formed stripe; between shoulder and scutellum at base of elytra in ♂ a spot, in middle of each elytra one, or sometimes several, spots, which in ♂ are small, in ♀ larger, before each apex an oblique, elongate spot, and at apex several (in ♀ more) flecks; in ♀ anteriorly near and on the suture there are several spots. Beneath and legs shining (the latter finely dusted), covered with scattered granules. Mesepisternum densely white tomentose, in ♀ are several spots on sides of sternites.

"Length ♂ 25 mm.; ♀ 23 mm.

"Patria: Coen district, Cape York.

"Type: ♂, as well as 1 ♂ and 2 ♀ in Museum at Dahlem.

Paratypes: ♀ in Senckenberg Mus., 1 ♂ in my coll."

The above is a translation of the original description.

5. GNOMA AGROIDES Thomson

Plate 1, figs. 7, 8.

Gnoma agroides Thomson, Classif. Ceramb. (1860) 106; Pascoe Trans. Ent. Soc. Lond. 3 3 (1866) 312; Schwarzer, Senckenbergiana 8 (1926) 284, pl. 4, figs. 18, 19; Breuning, Nov. Ent. Suppl. 3 2 (1945) 532.

Gnoma albotessellata Blanchard. Voy. Pole Sud., Zool. 4 (1853) 297, pl. 17, fig. 8. [New synonymy].

Gnoma albovittata Thomson, Classif. Ceramb. (1860) 107. [♀]

Gnoma propinqua Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 313.

Gnoma pseudosuturalis Schwarzer, Senckenbergiana 8 (1926) 286, pl. 4, figs. 16, 17. [New synonymy].

Male.—Rather robust; piceous or black, shining often reflexed with bluish, violet, or greenish, especially on legs and antennæ; sparsely covered with fuscous pubescence. Pronotum with a white tomentose vitta medially, often confined to basal portion. Scutellum entirely white tomentose. Elytra with a

sutural white or fulvescent vitta, having entire or irregular margins, running from scutellum to apex; at middle of base each side a short, dark fulvous, arcuate vitta, extending nearly to humerus; often sprinkled with fine, white maculæ, especially on side of disk and on apex, at middle frequently condensed to form a fine, transverse fascia, on densely maculate examples there is a vague dark band behind this fascia. Body beneath and legs more densely black or fuscous pubescent, maculate with white on side-pieces of mesosternum, on sides of metasternum, on metacoxæ, and on apex of first three sternites laterally. Antennæ sparsely hoary pubescent, more densely so on bases of third to fifth segments.

Head nearly impunctate except on antennal tubercles. Pronotum more than twice as long as wide at base; entire disk densely, rather coarsely multicarinate. Elytra arcuately attenuate to apices, which are separately broadly rounded; disk moderately coarsely, rather densely granulate-punctate on basal quarter, thence simply punctate to apex, the punctures gradually becoming minute, posteriorly. Mesosternum with a distinct tubercle anteriorly; fifth sternite boardly truncate at apex. Protibial spur long and acute; metafemora distinctly surpassing elytral apex. Antennæ two and one-quarters times as long as body, not fimbriate beneath; scape attaining pronotal apex, coarsely densely rugose and punctate above; third segment about three times as long as first, rugose above; fourth to seventh subequal, from eighth distinctly shorter, the seventh without a hair-pencil.

Female.—Like male, but more robust and much more heavily white-maculate. Head white-maculate above. Pronotum with vitta more distinct, in part double; disk often with reticular hoary markings. Elytra with sutural vitta largely fulvescent, broadly constricted behind middle; at middle a white marking which varies from a mere transverse line or narrow band to a broad area occupying nearly the entire anterior half of the elytra; at apical third often a less distinct fascia, leaving a broad black band between it and the median marking; apical third sprinkled with white to a varying degree. Body beneath maculate with dull fulvous instead of white. Pronotum very slightly longer than wide. Elytra less attenuate. Protibial spur reduced. Fifth sternite longer than third and fourth sternites together, rather narrowly emarginate at apex. Antennæ one-third longer than body.

Length 16 to 34 millimeters; width 4 to 8.

Type locality: Batchian (*agroides* and *albovittata*); Makian (*propinqua*); Magendouw, North Celebes (*pseudosuturalis*); Amboina (*albotessellata*).

Distribution: Moluccas, Celebes, and surrounding islands.

Celebes: 6 ♂, no locality data [AMNH, RNHL]. 2 ♀, Totok [EFG]. ♂, Magendouw [MCZ]. ♂, Toli-Toli [USNM].

Moluccas: 16 ♂, 12 ♀, Ternate [USNM, EFG, ANSP, MCZ, RNHL]. 17 ♂, 18 ♀, Halmahera [USNM, MCZ, ANSP, EFG]. 23 ♂, 19 ♀, Morotai [AMNH]. 19 ♂, 16 ♀, Batjan [USNM, ANSP, MCZ, RNHL, EFG]. ♀, Ceram [MCZ]. ♀, Uliasser Isl., Saparua Isl. [ANSP].

Gebeh: 3 ♂, 2 ♀ [MCZ, RNHL].

Key Isl.: ♂ [ANSP].

Salawati Isl.: ♂ [RNHL].

Waigeu Isl.: ♂ [RNHL].

Sangir Isl.: 2 ♂, Taruna, Great Sangir [EFG].

? Sumatra: ♀ [RNHL].

? Philippines: ♀, Palawan [ANSP].

Blanchard's description of *albotessellata* can only apply to the female of *agroides*; it is not a New Guinean species as indicated by Schwarzer.

6. GNOMA ADMIRALA ADMIRALA Dillon and Dillon, sp. nov. Plate 1, figs. 9, 10.

Male.—Rather slender; black. Head and pronotum very sparsely, finely brown pubescent, elytra finely, rather densely brown pubescent, the pubescence on apical half paler and more or less reticulate or mottled (caused in part by punctation); a small macula on humerus pale ochraceous. Scutellum densely white or pale yellowish-white pubescent. Beneath black, thinly, finely, gray pubescent, mesosternal sidepieces densely yellowish-white pubescent, as are the edges of the metacoxæ. Antennæ and legs black, thinly, finely, gray pubescent.

Head above finely alutaceous, vertex with a few coarse, shallow punctures; front with same sculpture as head but punctures at base of antennal tubercles deeper, more numerous. Pronotum at least two times as long as wide, rather regularly, transversely multicarinate; basal and apical sulci feeble. Elytra attenuate gradually to apices which are each narrowly rounded; disk with basal fifth rugosely granulate-punctate, thence to middle coarsely punctate, from middle to apex punctures much finer. Mesosternum at base with a small, obtuse tubercle, process narrowly rounded and with surface transversely rugose. Fifth sternite broadly rounded or feebly retuse. Profemora coarsely rugose

ventrally; protibiæ coarsely serrate ventrally, spur strong, acute apically; protarsi strongly dilate and fringed. Antennæ more than twice body length; scape attaining apex of pronotum, surface moderately scabrose; third segment from two to nearly three times length of scape, scabrose on basal two-thirds, coarsely, shallowly punctate on remaining portion; eleventh distinctly longer than tenth; seventh segment not pencilled.

Female.—Pronotum with five indistinct vittæ of thin whitish pubescence, one medially, one laterally, and one above procoxæ; basal half of elytra and apical quarter, white reticulate, less dense near base, leaving a broad brown fascia behind middle; beneath each sternite except fifth apically narrowly margined with white; femora with brownish pubescence dorsally. More robust, pronotum slightly elongate; the carinules of disk near apex tending to be arcuate medially; basal and apical sulci distinct; fifth sternite feebly emarginate apically; profemora obsoletely rugose ventrally; protibiæ obsoletely serrate ventrally, protarsi somewhat dilate, not heavily fringed; protibial spur obsolete; antennæ one and one-half times body length, segments less elongate, gray annulate basally.

Length 17 to 29.5 millimeters; width 4.5 to 8.

Holotype: Male, Admiralty Island, October 15, 1944, (P. T. Riherd) [USNM].

Allotype: Female, topotypic [USNM].

Paratypes: Male, topotypic. Male; Manus, Admiralty Island, November 1, 1944, (Emil Boger) [both USNM].

7. *GNOMA ADMIRALA PALLIDA* Dillon and Dillon subsp. nov. Plate 1, figs. 11, 12.

From the typical form, the male differs in having a much paler pubescence on the elytra, more nearly a uniform ochraceous, and much less reticulate in its pattern. In the female the differences are much more marked: the pubescence on the head and pronotum is much denser; the elytral basal half entirely densely white pubescent and much less reticulate; the apical quarter has more numerous and finer reticulations and the brown fascia narrower.

Type locality: Los Negros, Admiralty Islands.

Holotype and allotype in U. S. National Museum.

The holotype male and allotype female were captured by P. T. Riherd at the type locality on January 12, 1945.

8. *GNOMA UNIFORMIS* Dillon and Dillon, sp. nov.

Plate 1, figs. 13, 14.

Resembles *admirala* very closely, but the humeral macula more distinct; the female with only a trace of a median pale fascia; the mesosternal tubercle very prominent, strongly elevated and somewhat recurved at tip.

Male.—Rather slender, black; head and pronotum with extremely sparse, very short, fine gray pubescence; scutellum densely yellowish-white pubescent; elytra with dense, fuscous and deep ochraceous mottled pubescence, the latter pubescence much heavier on apical half; humeri with a bright ochraceous macula. Beneath black, very thinly, finely, gray pubescent; mesosternal sidepieces densely yellowish-white pubescent; metacoxæ and lateral apical margins of sternites narrowly ochraceous pubescent. Legs and antennæ black, thinly, finely, gray pubescent.

Head above minutely alutaceous, vertex with scattered, shallow punctures; front with scattered, coarse punctures, much denser on bases of antennal tubercles. Pronotum more than twice as long as wide; disk regularly, transversely multi-carinate. Elytra strongly attenuate to apices which are each narrowly rounded; disk on basal sixth with coarse, closely set granules, thence to basal half with coarse punctures, the punctures continued to apex but gradually finer. Mesosternum at base with a strong tubercle which is somewhat recurved at tip. Fifth sternite at apex broadly retuse. Profemora coarsely rugose ventrally; protibiæ serrate ventrally and spur strongly produced; protarsi strongly dilated and fringed. Antennæ twice body length; scape attaining apex of pronotum, surface scabrose; third feebly rugose, nearly three times length of scape; eleventh elongate, acuminate at apex.

Female.—With slightly heavier more ochraceous pubescence on head and pronotum; elytra at middle with a trace of a narrow, median, fulvous fascia and a few very small maculæ scattered over apical half; mesosternal sidepieces ochraceous pubescent. More robust; pronotum feebly transverse; fifth sternite broadly emarginate; (antennæ lacking from fifth); profemora not rugose ventrally; protibiæ not serrate and protibial spur obsolete; protarsi feebly dilated.

Length 18.5 to 24.5 millimeters; width 5.5 to 6.5.

Type locality: Los Negros, Admiralty Islands.

Holotype and allotype in U. S. National Museum.

The holotype female and the allotype male were captured at the type locality on January 12 and February 4, 1945, respectively, by Mr. Riherd.

9. *GNOMA GEELVINKA* Dillon and Dillon, sp. nov.

Plate 1, figs. 15, 16.

Very closely allied to *agroides* but constantly distinct in male having the sutural stripe of elytra narrower, very fine behind middle, a distinct, interrupted, transverse line at middle of elytra, and pronotum without trace of the median vitta. In female

the sutural line is merged with the anterior patch of white pubescence, and behind middle is very narrow, failing to re-expand after the post-median black fascia, and the pronotal median vittæ is fulvescent, not whitish and there are fulvous lateral vittæ present. Elytra less densely granulate in both sexes.

Male.—Rather slender; black, sparsely covered with fuscous pubescence. Head and pronotum immaculate. Scutellum largely white or fulvous pubescent. Elytra with a fine, white or fulvous, sutural stripe, becoming sub-linear behind middle, very feebly reexpanded before apex; each near middle of base with an irregular, fulvous macula; at middle an irregular, broad, white line or narrow fascia, sometimes interrupted, attaining sutural stripe and lateral margin; before apex with a large number of minute, well separated, white maculæ. Beneath as in *agroides* but markings fulvous-white instead of white. Legs and antennæ black, sparsely grayish pubescent.

Head nearly impunctate except on antennal tubercles. Pronotum more than twice as long as broad at base; entire disk densely, rather coarsely multicarinate. Elytra arcuately attenuate to apices, which are separately rounded; disk rather finely and sparsely granulate-punctate on basal quarter, thence simply punctate to apex, the punctures gradually becoming minute apically. Mesosternum with a prominent tubercle anteriorly; fifth sternite feebly emarginate at apex. Protibial spur rather long and acute; metafemora distinctly surpassing elytral apex. Antennæ twice length of body, not fimbriate beneath; scape attaining pronotal apex, coarsely, densely rugose and punctate above; third segment three times as long as first, slightly rugose on basal portion; fourth to seventh gradually shorter, from eighth suddenly shortened, the seventh without a hair pencil.

Female.—Like male but more robust; pronotum with a fulvescent double vitta at middle and a dark fulvous vitta each side; elytra with a common, triangular, white area occupying much of basal half; its posterior margin straight (not arcuate as in similarly-marked specimens of *agroides*, ♀), a fulvescent sutural line thence to apex, not widened apically as in *agroides*, on apical quarter a patch of vermicular, white maculæ, leaving a broad, black band free of maculæ behind middle. Beneath black, heavily fulvous pubescent, especially on pronotum, which is nearly entirely covered, mesosternum and its side-pieces, the sides of metasternum and the metepisternum, and

the metacoxæ; on the abdomen are small maculæ on the apex of each sternite laterally. Elytra less attenuate. Protibial spur reduced. Fifth sternite longer than third and fourth together, at apex truncate. Antennæ one-third longer than body.

Length 20 to 24 millimeters; width 5 to 6.5.

Type locality: Jobie Island, Geelvink Bay, New Guinea.

Holotype and allotype: Academy of Natural Sciences, Philadelphia; No. 8260.

Paratype in Naturhistoriska Riksmuseum, Stockholm.

10. *GNOMA BOISDUVALI* Plavilstihikov.

Plate 1, figs. 17, 18.

Gnoma girraffa Boisduval [non Schreibers], Voy. Astrolabe, Ins. 2 (1835) 508; Schwarzer, Senckenbergiana 8 (1926) 284, pl. 4, figs. 22, 23.

Gnoma boisduvali Plavilstihikov Koleop. Rund 17 (1931) 198; Breuning, Nov. Ent., Suppl. 3 2 (1945) 533.

Male.—Rather slender; piceous to dark reddish-brown, elytra usually darker, sometimes black; head and elytra with rather dense, dark brown pubescence. Front varied with pale gray or pale tawny pubescence. Pronotum medially at base with a short, indistinct, whitish vitta, which tapers apically. Scutellum densely white tomentose. Elytra on basal half and apical quarter reticulately maculate with thin, white pubescence, denser on apex, medially a common area of reticulate maculæ which is more or less diamond-shaped, the anterior angle at suture elongate and forming an irregular sutural vitta to scutellum; each humerus with a densely tomentose, white macula. Beneath piceous or dark reddish-brown, covered with very sparse, fine, gray pubescence; mesosternal sidepieces densely white maculate. Legs and antennæ piceous, with thin, fine, pale gray pubescence.

Head above and front finely alutaceous; the front with scattered, large, shallow punctures which are denser above and on antennal tubercles. Pronotum more than twice as long as wide, disk regularly, transversely carinate. Elytra gradually attenuate to apices which are separately narrowly rounded; basal quarter moderately densely granulate; thence to middle coarsely but not densely punctate, to apex more finely and less densely punctate. Mesosternum anteriorly with a broad obtuse tubercle, apex narrowly rounded; fifth sternite broadly, feebly obcordate at apex. Profemora and protibiæ rugose ventrally, protibial spur strong, protarsi dilated and fringed. Antennæ nearly twice body length; scape reaching to slightly beyond apex of pronotum, surface scabrose; third segment, nearly three times length of scape, scabrose on basal two-thirds; fourth and fifth subequal in length.

Female.—The body pubescence somewhat paler and more dense; head usually with two ochraceous vittæ above joined basally, front densely blotched with ochraceous. Pronotum with median vitta more distinct and usually attaining the apex. Scutellum and basal macula near humeri, ochraceous or whitish; the diamond-shaped macula is more heavily pubescent (this varies from same size as in male to a much larger one). More robust; pronotum only about one-third longer than wide, the carinæ sometimes very irregular; elytra widened behind middle; mesosternal tubercle less strongly produced; fifth sternite emarginate at apex; the protibial spur feeble; profemora and protibiae not rugose.

Length 11 to 24 millimeters; width 3.3 to 5.6.

Type locality: New Guinea.

Distribution: New Guinea.

New Guinea: 11 ♂, 10 ♀, no locality data [RNS, USNM, RNHL, AMNH, MCZ]. 5 ♂, 10 ♀, Oro Bay, Jan. 1944 (*J. R. Heller*) [LL]. 18 ♂, 20 ♀, Hollandia [LL, USNM]. 4 ♂, 6 ♀, Aitape, Papua [LL]. ♀, Cromwell Range [LL]. 2 ♂, ♀, Sattelberg [MCZ, USNM]. 2 ♂, 3 ♀, Astrolabe Bay [ANSP]. 7 ♂, 5 ♀, Stephansort, Astrolabe Bay, [ANSP, RNS]. ♂, Nadzat Markham, R. Val. [USNM]. 3 ♂, 2 ♀, Toem [USNM]. 2 ♂, 2 ♀, Finchhaven [USNM]. 4 ♂, ♀, Monumbo [RNHL]. ♀, Alexishalen [RNHL]. 4 ♂, 2 ♀, Lae, December 1944 to January 1945 (*J. G. Brooks*) [A.M.]. 10 ♂, 5 ♀, Mt. Lamington Dist, August 1929 (*C. T. McNamara*) [A.M.]. ♂, Aitape, February 1936 (*A. J. Marshall*) [A.M.].

11. *GNOMA LONGICOLLIS LONGICOLLIS* Fabricius.

Plate 2, fig. 13.

Cerambyx longicollis Fabricius, Mant. Ins. 1 (1787) 135.

Gnoma longicollis Fabricius. Fabricius, Syst. Eleuth 2 (1801) 315; Gmelin, in Linné, Syst. Nat. ed. 13, I, 4 (1790) 1826; Castelnau, Hist. Nat. Col. 2 (1840) 481; Schwarzer, Senckerbergiana 8 (1926) 280, pl. 4, figs. 1, 2; Breuning, Nov. Ent., Suppl. 3 2 (1945) 530.

Gnoma confusa Thomson, Syst. Ceramb. (1865) 555. [New synonymy].

Gnoma longitarsus Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 314. 314.

Very close to *sticticollis* Thomson, but differs from it in having the pubescent maculæ of the elytra and the scutellum bright or deep fulvous instead of whitish; the granulation on elytra finer and not coalescent; the transverse rugæ of pronotum more distinct; metasternum with a prominent tubercle medially and antennæ not annulate.

Male.—Slender; entirely dark reddish-brown to fuscous, covered with dark brown pubescence. Head above fulvous-brown to fulvous pubescent, often brighter near eyes; front brown, margined with bright fulvous. Pronotum usually without trace of a median vitta but sometimes one is indicated by an indistinct concentration of paler brown pubescence. Scutellum deep fulvous pubescent. Elytra with deep or bright fulvous pubescent maculae, usually reticulating, sparse or nearly wanting on basal half, forming an indistinct band at middle, and covering the apical third almost entirely and there sometimes forming an oblique, ovate vitta before apex. Body beneath ashy-gray pubescent, with bright yellow vittae or bands on meso- and metasternal sidepieces, on metasternum laterally, and on sides of apical margins of the abdominal sternites. Legs and antennae ashy-gray pubescent.

Head above finely punctate between eyes; front rather sparsely, moderately finely punctate, especially between eyes. Pronotum nearly two and one-half times as long as broad at base; disk regularly transversely multicarinate; transverse sulci obsolete. Elytra tapering apically, apices separately, rather narrowly rounded; disk on basal quarter rather finely, not densely granulate, the granules displaced by punctures which gradually diminish in size to apex. Mesosternum with a prominent tubercle medially; fifth sternite not quite as long as third and fourth together, apically emarginate. Protibiae with spur distinct but small; metafemora surpassing elytral apex. Antennae more than twice as long as body, beneath sparsely fimbriate on third to sixth segments; scape attaining apex of pronotum, rather coarsely rugosely punctate; third segment nearly four times as long as scape; fourth to seventh segments gradually shorter, the rest much shorter; without trace of a hair pencil.

Female.—Like male, but more robust; pronotum one and two-thirds as long as wide; elytra slightly widened to behind middle; protibial spur reduced; fifth sternite longer than third and fourth together, apex retuse; legs shorter; antennae one and one-half times as long as body.

Length 13 to 28 millimeters; width 2.5 to 6.

Type locality: East Indies (*longicollis*); Singapore, Sarawak (*longitarsus*); Borneo (*confusa*)

Distribution: Borneo

Borneo: 2 ♂, 2 ♀, no locality data [MCZ, RNHL]. 8 ♂, 6 ♀.

Pontanak [RNHL]. 4 ♂, 4 ♀, Brunei [USNM; ANSP]. 3 ♀, Sandakan [USNM]. ♂, Mt. Liang [RNHL]. 3 ♂, 3 ♀, Baram, Sarawak [MCZ]. 4 ♂, 3 ♀, Mahakkam [RNHL].

12. *GNOMA LONGICOLLIS DISPERSA* Pascoe.

Plate 2, fig. 14.

Gnoma dispersa Pascoe, Proc. Zool. Soc. Lond. May (1866) 252; Trans. Ent. Soc. Lond. 3 3 Sept. (1866) 314.

Differs from the typical form from Borneo in the following details: Head above with fulvous pubescence only between eyes; pronotum more densely pubescent; elytra with a considerable amount of fulvous pubescence on humeri and maculation over rest of disk denser, especially on basal half.

Length 20 to 22 millimeters; width 4 to 5.

Type locality: Penang [?].

Distribution: Malay Peninsula.

Malay States: ♂, Malacca [MCZ]. ♂, Perak [ANSP].

13. *GNOMA LONGICOLLIS SUMATRENSIS* Dillon and Dillon, subsp. nov. Plate 1, fig. 15.

Similar to *l. dispersa* but head usually ochraceous pubescent above; pronotum usually with a vague vitta medially; elytra with maculation usually paler and considerably denser; and maculation of undersurface dull in color or obscure. Front very finely sparsely punctate.

Length 16 to 23 millimeters; width 4 to 5.5.

Type locality: Tandjong, Morawa, Serdang. Sumatra.

Type allotype and paratypes in Rijksmuseum van Natuurlijke Histoire, Leiden.

Described from fifteen specimens from Sumatra; the type male; female allotype from Sipirok; three males and two females from Manna; male from Tapanoeli; two male and two female paratypes from Sumatra; male paratype from Oerbosch in the Leiden Museum; male paratype from Mt. Soom, Tanggamoos, in Lionel Lacey collection; and a female paratype from Lompong in the Academy of Natural Sciences, Philadelphia.

14. *GNOMA LONGICOLLIS CASNONIOIDES* Thomson.

Gnoma casnonioides Thoms. Classif. Ceramb. (1860) 106.

"Blackish, obsoletely variegate, beneath laterally obsoletely yellow maculate; scutellum yellow. Head obsoletely punctate; scape granulate, rest smooth. Prothorax elongate, narrow, in middle constricted, broader behind; transversely, strongly, and closely sulcate. Scutellum smooth. Elytra elongate, much

broadier than prothorax and about two times longer than it, anteriorly tuberculate, then strongly and closely punctate; apically smooth, rounded. Body beneath smooth. Legs elongate, here and there coarsely punctate. Length 18 millimeters; width 5. India.

"Close to *G. longicollis* and *G. sticticollis* but differs in prothorax less elongate, elytral sculpturing stronger and more concealed, and legs here and there coarsely punctate." (Translation of the original description).

15. GNOMA GILMOURI Dillon and Dillon, sp. nov.

Plate 2, fig. 17.

This form is remarkably close in appearance to *G. longicollis dispersa* (likewise from the Malay Peninsula) but is at once distinct in having a hair pencil on the seventh antennal segment in the male. Other differences are found in the front being more densely, uniformly punctate; elytra with a distinct, oblique, dark fascia behind middle; the smaller body size; the presence of yellow pubescence on pro- and mesosternum and on the procoxæ; the shorter antennæ, and the antennal scape more rugosely punctate.

Male.—Slender; piceous antennæ, legs, and elytra slightly paler; fuscous pubescent. Head above ashy pubescent, mottled with drab brown, ochraceous between eyes and antennæ; front dark brown, margined with fulvous. Pronotum without trace of a median vitta. Scutellum ochraceous. Elytra on apical half densely mottled with fulvous, except for a distinct oblique fascia at apical third which is usually almost entirely devoid of maculæ, basal half sparsely maculate but a little more densely so around humeri. Body beneath, legs, and antennæ ashy-gray pubescent; with bright yellow, linear markings on metasternum laterally, and on side-pieces of meso- and metasternum, and on abdominal sternites; mesosternum and prosternum bright yellow pubescent especially medially.

Head above finely, sparsely punctate between eyes; front moderately finely, rather densely, uniformly punctate. Pronotum twice as long as wide; disk regularly, transversely multicarinate, carinæ often interrupted at middle; apical transverse sulcus obsolete, basal one fine. Elytra slightly attenuate apically, apices separately rounded; disk on basal quarter finely, not densely granulate, thence punctate, the punctures finer towards apex. Mesosternum with a feeble tubercle medially; fifth sternite shorter than third and fourth together, apex emarginate. Protibial spur subobsolete; metafemora attaining elytral apex. Antennæ one and one-half times as long as body, scarcely fringed

beneath on third to sixth segments; scape attaining pronotal apex, coarsely, rugosely punctate; third segment nearly four times as long as scape; fourth to seventh gradually shorter, the rest much shortened; seventh segment with a recurved hair pencil at apex.

Female.—Like male, but more robust; pronotum less elongate; elytra often wider behind middle; protibial spur wanting; fifth sternite apically retuse; legs shorter; and antennæ only one-third longer than body.

Length 13 to 18 millimeters; width 3 to 4.5.

Type locality: Perak.

Holotype, allotype, and paratype in collection of E. F. Gilmour.

The type male and allotype female are from the type locality; the male and seven female paratypes are from Res. Benkoelen, Marang.

16. *GNOMA STICTICOLLIS* Thomson.

Plate 2, fig. 16.

Gnoma sticticollis Thomson, Arch. Ent. 1 (1857) 297.

Gnoma subfasciata Thomson, Syst. Ceramb. (1865) 555; Schwarzer, Senckenbergiana 8 (1926) 280, pl. 4, figs. 3, 4.

Gnoma raffrayi Thomson, Typi Ceramb. (1878) 70.

Gnoma atomaria Guérin, Breuning, Nov. Ent., Suppl. 3 2 (1945) 530.

Gnoma sticticollis Thomson, Syst. Ceramb. (1865) 555, for which see *G. Thomsoni*.

Male.—Rather slender; entirely dark reddish-brown, elytra a little paler; covered with short, fuscous pubescence. Head above often dingy or pale fulvous-gray; front fulvous, with an indistinct patch of brownish each side, rarely mottled with brown. Pronotum with pubescence a little paler medially but not forming a vitta, on sides more distinctly paler. Scutellum whitish or yellowish. Elytra with whitish, pale yellow, or pale fulvous pubescence irregularly placed on basal quarter and in the form of minute maculæ over rest of disk, the maculæ often vermiculate and coalescent, forming an oblique band at middle and a large patch covering apical third, leaving a band behind middle, and often a similar one before middle, free of maculæ. Body beneath and legs sparsely ashy pubescent, with glabrous punctures; body laterally and femora irregularly tinged and vittate with dingy fulvous or light yellow. Antennæ from base of third segment distinctly paler than body, thinly fuscous pubescent, segments from third broadly but inconspicuously annulate with ashy-gray.

Head above sparsely, finely punctate; front rather sparsely, coarsely punctate, especially between the eyes. Pronotum

nearly two and one-half times as long as wide at base; disk regularly transversely multicarinate, transverse sulci obsolete. Elytra tapering apically, apices separately, broadly rounded; disk on basal quarter moderately coarsely, densely granulate, thence less densely punctate, punctures finer apically. Mesosternum medially briefly tuberculate; fifth sternite emarginate at apex. Protibiæ with spur poorly developed. Antennæ more than twice as long as body, fringed beneath on third to sixth segments; scape feebly surpassing pronotal apex, coarsely rugosely punctate; third segment nearly four times as long as scape; fourth to seventh subequal, shorter than third, rest suddenly shorter, eleventh longer than tenth; without trace of a hair pencil.

Female.—Like male, but more robust; pronotum two-fifths longer than wide at base; elytra less tapering; protibial spur lacking; fifth sternite longer, apex broadly emarginate; legs shorter, especially hind ones; antennæ only one and one-half times as long as body, segments gradually diminishing from fourth, except eleventh, which is slightly longer than tenth.

Length 20 to 28 millimeters; width 4 to 6.

Type locality; Celebes, Java (*sticticollis*); Java (*subfasciata*) and (*raffrayi*)

Distribution: Java.

Java: ♂, 2 ♀, no locality data [RNHL] 22 ♂, 15 ♀, Preanger [RNHL, LL-♂]. ♀, Sukabumi [RNHL]. 2 ♀, Pengalengan [RNHL]. ♀, Mt. Tengger [RNHL]. ♀, Mt. Tjikurai [RNHL]. 2 ♂, Senggoro Mts. of Res. Pasoeroean [USNM, ANSP]. ♂, Boeloe Lawang, Pasoeroean Res. [ANSP].

17. GNOMA THOMSONI Dillon and Dillon, nom. nov.

Plate 3, fig. 1.

Gnoma sticticollis Thomson [non Thomson, 1857], Syst. Ceramb. (1865) 555.

Male.—Rather slender; piceous, very sparsely fuscous pubescent. Head entirely dull ochraceous pubescent; front irregularly mottled with dark brown. Pronotum with a median dull ochraceous vitta feebly indicated at base, on each side with a broader and more distinct one. Scutellum fulvous. Elytra with brown-fulvous pubescence, becoming brighter and denser apically; very sparingly sprinkled with small, irregular, whitish maculæ, often denser on apical half. Body beneath and legs as upper surface, the body laterally and on mesosternum maculate and vittate with yellow. Antennæ piceous, from

fourth segment becoming paler, indistinctly annulate with gray on bases of segments beginning with third.

Head above minutely punctate around eyes; front coarsely, rather densely punctate. Pronotum nearly two and one-half times as long as wide at base; disk rather irregularly multicarinate. Elytra arcuately tapering apically; apices separately, rather narrowly rounded; disk on basal quarter moderately densely, rather finely granulate, thence punctate to apex, punctures becoming fine posteriorly. Mesosternum anteriorly tuberculate medially; fifth sternite broadly truncate and feebly emarginate at apex. Protibial spur wanting or obsolete. Antennæ about one-half longer than body, sparsely fimbriate beneath on third to fifth segments and with a few hairs present on underside of sixth; scape scarcely surpassing pronotal apex, coarsely rugosely punctate; third segment three times as long as scape; rest gradually shorter; the seventh segment with a long recurved hair pencil.

Female.— A little more robust than male; pronotum only one and one-half times as long as wide at base; elytra slightly widened to behind middle; fifth sternite more narrowly truncate; and antennæ with segments suddenly shorter after the sixth, the seventh lacking a hair pencil.

Length 13 to 24 millimeters; width 2.8 to 6.

Type locality: Java.

Distribution: Java.

Java: 6 ♂, 4 ♀, no locality data [USNM, LL, RNHL, MCZ].

10 ♂, 4 ♀, Senggoro Mts., Pasoeroean Res. [USNM, ANSP]. 3 ♂, Soekaboemi [USNM, ANSP]. ♂, Boeloe Lawang, Pasoeroean Res. [ANSP]. 2 ♂, ♀, Tesgoe [RNHL]. ♀, Djampang, Koelon [ANSP]. ♂, Pradjekan [MCZ]. ♂, ♀, Malang [RNHL]. ♀, Toegoe [RNHL].

18. *GNOMA ATOMARIA* Guérin

Gnoma atomaria Guérin, in Belanger, Voy. Ind. Orient. Zool. (1834) 487, pl. 2, fig. 6.

"This species is quite distinct from all other known species by the brown elytra spotted with small, white points. Head larger, ochraceous pubescent. Antennæ nearly two times length of body, first segments black, rest whitish at base. Pronotum elongate, more than twice as long as broad, cylindrical, retracted at middle and broader at base; strongly transversely rugose; at middle and on lateral margins with longitudinal yellow lines, very distinct, beginning at base and disappearing

towards middle of length of pronotum. Elytra punctate with brown maroon, darker at base; with small white points arranged in transverse bands, more numerous at apex. Body beneath blackish, with yellow lines along border of elytra and bordering segments of abdomen. All legs blackish, forelegs largest. Length 15 milimeters; width 4. Coromandel Coast." (A translation of the original description).

This species comes very close to *thomsoni*, but apparently differs in having the white elytral maculæ denser apically and the elytra bordered with yellow lines.

19. *GNOMA NICOBARICA* Breuning

Gnoma nicobarica Breuning, Festchr. E. Strand 1 (1936) 304; Nov. Ent., Suppl. 3 2 (1945) 529.

"Very elongate, antennæ about one-fourth longer than body (♀), scape short, finely punctate, antennal tubercles moderately high, lower ocular lobe somewhat longer than genæ, front broader than high, rather densely, finely punctate. Pronotum one-third longer than broad, transversely rugose and on basal half finely punctate. Scutellum pentagonal. Elytra very long, at base finely granulate, thence densely punctate, punctures finer apically, obsolete on apical fourth. Black, head (except a small black macula on each side of occiput), scutellum, body beneath, legs and antennæ brown-yellow tomentose; pronotum and elytra brown tomentose and densely brown-yellow tomentose, apical halves of third and tenth antennal segments and middle part of eleventh brown tomentose. Length 23 to 26 millimeters. Type 1 ♀ from Nicobars in Brit. Mus."

The above is a translation of the original description.

20. *GNOMA SUBLAEVIFRONS* Schwarzer.

Plate 2, fig. 18.

Gnoma sublævifrons Schwarzer, Senckenbergiana 8 (1926) 285, pl. 4, fig. 7.

Gnoma longicollis Breuning [non Fab.], Nov. Ent., Suppl. 3 2 (1945) 530.

Male.—Rather slender; piceous; head and pronotum thinly, elytra more densely covered with irregular, tawny pubescence. Beneath piceous, abdomen dark chestnut, thinly grayish-yellow pubescent. Legs and antennæ dark reddish-brown, or piceous, with thin, fine gray pubescence.

Head above finely alutaceous; front with a few coarse punctures at base of antennal tubercles. Pronotum nearly twice as long as wide; disk transversely carinulate at apex somewhat irregular. Elytra attenuate to apices, which are separately, narrowly rounded; basal quarter rather coarsely granulate, the

granules separate, thence to behind middle coarsely, densely punctate, at apical quarter the punctures finer. Mesosternum with a median ridge, not a distinct tubercle; fifth sternite broadly retuse at apex. Profemora not rugose; protibiæ not serrate, the spur obtuse; protarsi heavily fringed. Antennæ nearly twice body length; scape rugosely punctate; third segment about three and one-half times length of scape, punctate; fourth longer than fifth; seventh not pencilled; eleventh elongate; feebly fimbriate on third and fourth segments ventrally.

Length 23 millimeters; width 5.2.

Type locality: Nias.

Distribution: Nias.

Nias: ♂, Kalim Bungo, Central Nias, July-November 1894 (R. Mitschke) [ANSP].

This specimen lacked the "indication of the band" which is slightly post-median, as Schwarzer describes the type.

21. *GNOMA JUGALIS MERIDIONALIS* Schwarzer.

Plate 2, fig. 5.

Gnoma jugalis Schwarzer [non Newman], Senckenbergiana 8 (1926) 281, pl. 4, figs. 8, 9.

Gnoma jugalis meridionalis Schwarzer, Senckenbergiana 9 (1929) 372; Breuning, Nov. Ent., Suppl. 3 2 (1945) 531.

Easily distinguished from many of the fasciate groups by the elytra having a very narrow, distinct, white fascia at middle, the remaining surface irrorate (sometimes more reticulate) with fulvous to ochraceous pubescence.

Male.—Rather slender; fuscous, dark brown pubescent, denser on elytra. Head above with indistinct patches of grayish, front rather heavily mottled with ochraceous. Pronotum thinly, finely, gray pubescent, pubescence sometimes denser medially to form an indistinct vitta; laterally and above procoxæ an ochraceous vitta, the former not reaching beyond middle, sometimes both grayish. Scutellum ochraceous. Elytra with basal and apical two-fifths rather densely ochraceous reticulate, the reticulations becoming white near middle, at middle with a narrow, white fascia, which is very irregular on its anterior border. Beneath piceous or fuscous, laterally broadly, densely ochraceous, medially finely gray pubescent; sternites (except fifth which has only one) each with a double row of small, dark maculæ. Legs piceous, thinly, finely, gray pubescent. Antennæ piceous, gray pubescent, apices dark.

Head above finely alutaceous, vertex with a few coarse, deep punctures; front with a few scattered, coarse, shallow punctures, those near antennal tubercles deeper and more numerous.

Pronotum one and one-half times long as wide, regularly, transversely multicarinate. Elytra less strongly attenuate than in other species of this group; apices narrowly rounded; basal quarter moderately granulate, the granules broad, somewhat squamose, remainder of disk punctate, punctures well spaced, finer apically. Mesosternum basally with a large, rounded tubercle, process feebly, transversely rugose, apex narrowly rounded. Fifth sternite at apex broadly retuse. Profemora ventrally feebly, transversely rugose on basal half; protibia ventrally not serrate, spur obtuse and feeble; protarsi dilated and fringed. Antennæ about one and one-half times body length; scape reaching slightly beyond apex of pronotum, with moderate-sized punctures which are well-spaced; third segment two and one-half times the length of scape; eleventh segment longer than tenth, aciculate at apex; seventh segment pencilled.

Female.—More robust; color and markings as in male; pronotum less elongate, carinæ less regular; fifth sternite broadly emarginate; profemora barely rugose ventrally; protibial spur lacking; protarsi only feebly dilate.

Length 17 to 20 millimeters; width 4.6 to 5.7.

Type locality: Surigao, Mindanao, Philippines.

Philippines: 2 ♀, Davao, Mindanao (*Platen*) [ANSP].
4 ♂, 2 ♀, Butuan, Mindanao (*Baker*); [USNM]. ♂, 2 ♂,
Surigao, Mindanao [USNM]. ♂; Davao, Mindanao
[USNM].

22. *GNOMA JUGALIS SAMAR* Dillon and Dillen, subsp. nov.

Plate 2, fig. 6.

Differs from the nymotypic form in having two irregular, ochraceous vittæ on head above, the median pronotal vittæ distinct and ochraceous; the white reticulations near middle on elytra absent or nearly so; the brown fascia behind median, white one, wider.

Length 17.3 to 22 millimeters; width 4.5 to 5.5.

Holotype: Male, Samar Island (*Baker*) [USNM].

Allotype: Female, topotypic [USNM].

Paratypes: Three males, topotypic [USNM].

23. *GNOMA JUGALIS JUGALIS* Newman

Gnoma jugalis Newman, Entomologist 1 (1842) 299; Schwarzer, Senckenbergiana 9 (1929) 370, fig. 24; Breuning, Nov. Ent., Suppl. 3 2 (1945) 531.

According to Schwarzer, the typical race differs in having the transverse white fascia in the middle of the dark brown fascia, while in *meridionalis* it is behind the dark band. This does not hold true in the specimens at hand, but, as no Luzon representatives were encountered, it is impossible to decide

whether there are valid differences between these two supposed races.

24. GNOMA LUZONICA LUZONICA Erickson

Plate 2, fig. 18.

Gnoma luzonicum Erickson, Nova Acta Acad. Nat. Curiosum 16 Suppl. 7 (1834) 268, pl. 39, fig. 8; Schwarzer, Senckenbergiana 8 (1926) 281, pl. 4, figs. 10, 11; Breuning, Nov. Ent., Suppl. 3 2 (1945) 531.

Male.—Rather slender; piceous or dark brown, head and pronotum thinly, elytra densely covered with dark brown pubescence. Head above with an arcuate vitta of from pale tawny to deep tawny pubescence, the vittæ joined on occiput and on vertex, usually there are several small oblique vittæ from the interior margin of each of the large vittæ which meet at middle of head; front irregularly marked and lower lobe of eye margined with tawny; a narrow vitta behind lower lobe of eye, bifurcated towards base. Pronotum with an indistinct, pale tawny vitta medially, another vitta laterally (in line with lateral vitta on head) indistinct and of same color as median vitta or of the color of vittæ on head, entire surface of disk variegated with pale tawny. Scutellum densely, pale tawny pubescent. Elytra with reticulated patches of pale tawny which are denser at base and apex and form a common diamond-shaped macula at middle and a rather irregular, sutural vitta. Beneath dark brown or piceous, thinly, finely, gray pubescent; mesosternal sidepieces, metepimera, metasternum laterally, and sternites laterally and apically, dark tawny pubescent. Legs dark brown or piceous, tibiæ slightly paler; scape piceous, remaining segments slightly paler; scape, basal two-thirds of third, and remaining segments gray annulate.

Head above finely alutaceous, with a few well-spaced, coarse punctures; front with few, very shallow, coarse punctures, except at base of antennal tubercles where they become deeper, larger, and closer, forming rugosities. Pronotum not quite twice as long as wide, disk regularly, transversely multicarinate. Elytra with sides broadly arcuate, gradually attenuate apically; basal quarter finely, moderately densely granulate or granulate-punctate, thence to middle coarsely, rather sparsely punctate, finer apically; apices each narrowly rounded. Mesosternum with a small but distinct tubercle anteriorly; the process narrowly rounded apically; fifth sternite broadly truncate at apex. Profemora serrate ventrally; protibial spur strong; pro-tarsi densely fringed. Antennæ at least twice body length, scape reaching slightly beyond apex of pronotum, surface finely, densely punctate with coarse, shallow punctures interspersed;

third segment nearly three times length of scape, feebly rugose; fourth, fifth, sixth and seventh gradually shorter, seventh pencilled at apex, from eighth suddenly shorter, except eleventh which is slightly longer than tenth; feebly fimbriate ventrally on scape and third and fourth segments.

Female.—More robust; elytra nearly parallel to behind middle, then arcuate to apices; pronotum with carinae less regular, sometimes broken medially; mesosternum less strongly tubercled anteriorly; fifth sternite feebly emarginate apically; profemora not serrate ventrally; protibial spur feeble; protarsi not fringed; antennae one and one-half times body length; third segment only two and one-half times as long as scape; seventh segment not pencilled; the bases of the segments from third more heavily gray pubescent.

Length 14.5 to 23 millimeters; width 4.3 to 6.

Type locality: Luzon.

Distribution: Philippine Islands.

No locality data: ♂, ♀ [MCZ].

Luzon: ♂; no locality data [MCZ]. ♂, North Luzon (EFG).

♀, Bayombong [MCZ]. 20 ♂, 20 ♀, Mt. Makiling, May to

October (*Baker, Hadden*) [USNM, CAS]. 2 ♂, Mt. Isarog

[MCZ]. ♂, Bangui, Ilocos, November 1923 (*McGregor*)

USNM]. 4 ♂, 2 ♀, Los Baños (*Baker, Hadden*) (USNM,

CAS]. ♂, Mt. Banahao, Laguna (*McGregor*) [CAS].

♂, Mt. Maranggoy, Zambales (*McGregor*) [CAS]. ♀, Mt.

Triman [CAS]. ♂, Mt. Dimatabing (*McGregor*) [CAS].

2 ♂, Quezon Park, Tayabas, May 16, 1931 [CAS]. 3 ♂,

5 ♀, Iriga, Camarines Sur, June, August (*Caneda*) [CAS].

Sibuyan Island: 8 ♂, 6 ♀ [USNM, CAS].

Mindanao: ♂, Kabasalan, Zamboanga, May 1, 1932 (*Muzzall*) [CAS].

23. GNOMA LUZONICA INSULANA Schwarzer

Plate 2, fig. 9.

Gnoma insulana Schwarzer, *Senckenbergiana* 8 (1926) 285, pl. 4, figs. 12, 13.

Gnoma luzonicum transiens Kriesche, *Ent. Blätt*, 32 (1936) 69.

Differs from the nymotypic form in having the pattern pubescence of upper surface entirely white; the diamond-shaped macula at middle of elytra more transverse, becoming fasciate at lateral angles; elytra with less of the reticulating maculae.

Length 16 to 28.5 millimeters; width 4.5 to 6.5.

Type locality: Biliran, Leyte, P. I. (*insulana*); Santa Cruz, Leyte (*transiens*).

Distribution: Leyte, Mindanao, and Samar Islands.
 Philippines: ♂, no locality data [MCZ]. ♀, Mindanao [EFG].
 3 ♂, 4 ♀, Samar Island (Baker, McGregor) [USNM].

26. *GNOMA LUZONICA BILARAS* Dillon and Dillon subsp. nov. Plate 2, fig. 10.

Differs from the other two subspecies in the following ways: From *l. luzonica* in having the color of the pattern pubescence dirty white and in lacking the common diamond shaped macula at middle. From *l. insulana* it differs in having the fascia broadly separated from suture, narrower, and less irregular in outline; fine maculation of sides greatly reduced.

Length 16 millimeters; width 4.5.

Type locality: Bilar, Bohol Island.

Type allotype, and paratype in U. S. National Museum.

The female holotype and paratype were collected at the type locality September, 1932, by McGregor. The male allotype was taken at Biliran Island, by Baker.

27. *GNOMA SUTURIFERA SUTURIFERA* Schwarzer.

Plate 2, fig. 11.

Gnoma suturifera Schwarzer, Senckenbergiana 9 (1929) 370, fig. 23; Breuning, Nov. Ent., Suppl. 3 2 (1945) 532.

Resembles *G. luzonica* but has a very distinct sutural vitta which is whitish with lateral margins of ochraceous, it also lacks the diamond-shaped median macula of the elytra.

Male.—Rather slender; black or piceous, dark brown pubescent. Head above with a narrow, arcuate, ochraceous vitta on either side of middle, inner margin irregular, converging on occiput and at vertex; front irregularly blotched with pubescence of the same color. Pronotum with five narrow vittæ of yellowish-white pubescence, on median, one lateral, one above procoxæ (this sometimes slightly darker). Scutellum white or pale ochraceous pubescent. Elytra with a narrow, common, sutural vitta of whitish or yellowish-white pubescence, the outer margin irregular and narrowly ochraceous; the lateral margins of disk, base, and apex with ochreous reticulate markings. Beneath piceous, thinly clothed with fine, pale gray pubescence, with a wide, ochreous, lateral vitta from pronotum to tip of abdomen, an irregular macula of same color laterally on metasternum, and apex of sternites narrowly margined with same; sternites each with a double row of dark maculæ laterally (sometimes the inner row indistinct). Antennæ and legs piceous; legs clothed with dense, fine, gray pubescence; antennæ with basal two-thirds gray pubescent.

Head above finely alutaceous, with a few, coarse, deep punctures, especially medially; front finely alutaceous, with scattered, very shallow, coarse punctures, the bases of the antennal tuber-

cles densely, coarsely punctate. Pronotum not quite twice as long as wide; disk rather regularly, transversely carinate, the carinæ apically and basally somewhat interrupted medially. Elytra gradually attenuate to apices, which are separately, narrowly rounded; disk on basal quarter moderately densely granulate-punctate, coarsely punctate to middle, thence to apex punctures finer and less dense. Mesosternum basally with a large, obtuse tubercle, the process feebly elevated medially, the apex narrowly rounded; fifth sternite broadly retuse apically. Profemora coarsely rugose ventrally; protibial spur strong, protibiæ dilated and fringed. Antennæ about one and one-half to one and three-quarters times body length; scape attaining apex of pronotum, surface moderately rugosely-punctate; third segment nearly three times longer than scape, rugose along nearly its entire length; seventh segment pencilled at apex.

Female.—Antennæ more heavily gray annulate; more robust; elytra slightly widened behind middle; pronotum with carinæ less numerous and less sharply defined; fifth sternite broadly emarginate apically; profemora not rugose ventrally; protibial spur almost entirely lacking; protarsi not dilated and fringed. Antennæ about one and one-third body length; not pencilled on seventh segment.

Length 17.5 to 22 millimeters: width 5 to 5.6.

Type locality: Cuernos Mountains, Negros, Philippine Islands.

Distribution: Philippine.

Philippines: 4 ♂, 2 ♀, Cuernos Mountains, Negros [USNM].

2 ♂, N. W. Panay (*Baker*) [USNM].

28. *GNOMA SUTURIFERA FASCIATA* Dillon and Dillon, subsp. nov. Plate 2, fig. 12.

Female.—Distinct from the nymotype in having on the elytra a distinct transverse median whitish line, running from sutural vitta entirely across disk, the fine maculæ on the sides of the disk are whitish or pale fulvous, and the sutural stripe is much interrupted on apical half.

Length 18 millimeters; width 5.

Holotype: ♀, no locality data (*L. Dorn*) [RNHL].

29. *GNOMA PULVEREA PULVEREA* Pascoe

Plate 2, fig. 1.

Gnoma pulverea Pascoe, Trans. Ent. Soc. Lond. 3 3 (1866) 314; Schwarzer, Senckenbergiana 8 (1926) 284, pl. 4, figs. 14, 15; Breuning, Nov. Ent., Suppl. 3 (1945) 533.

Male.—Rather slender; fuscous or black, usually with a bluish or purplish reflex, covered with fine, dark brown pubescence, denser on elytra. Head above with an indistinct, irregular macula of grayish or pale tawny pubescence; front irregularly mot-

tled with same pubescence. Pronotum with five indistinct, grayish-yellow, thinly pubescent vittæ, one media, widest, one on each side, and one above each procoxa. Scutellum and a large macula at base near humeri of elytra, ochraceous or fulvous; sutural vitta very much broken into small maculæ of yellowish-gray pubescence, at middle a vague fascia of small maculæ of same pubescence, base and apex with small scattered maculæ of yellowish-gray. Beneath fuscous, densely yellowish or yellowish-gray pubescent, and with fulvous or ochraceous markings as follows: maculæ on mesosternal sidepieces, metepisternum, metasternum laterally and sternites laterally. Antennæ and legs piceous, thinly, finely gray pubescent, the pubescence denser on legs.

Head above minutely alutaceous, front as head above but with a few coarse punctures on base of antennal tubercles. Pronotum twice as long as wide, disk regularly transversely multicarinate. Elytra attenuate to apices which are each narrowly rounded; basal quarter granulate-punctate, the granules poorly defined, thence to middle coarsely punctate, punctures from middle to apex finer but not less dense. Mesosternum at base with a small, round tubercle, the base of which is rugose; at base of anterior metasternal process a small but wide, transverse sulcus (this sometimes nearly a triangular fovea); fifth sternite at apex broadly retuse. Profemora feebly rugose ventrally on basal half; protibial spur short, blunt; protarsi dilated and fringed. Antennæ nearly twice body length; scape reaching slightly beyond apex of pronotum, surface coarsely, rugosely punctate or sometimes scabrose; third segment nearly three times length of scape, finely densely punctate with scattered, coarse punctures especially on basal half; eleventh longer than tenth, aciculate at apex.

Female.—Color as in male, but somewhat more pubescent; antennæ gray annulate basally; pronotum slightly longer than wide; fifth sternite emarginate at apex; antennæ about one and one-third to one and one-half times body length; profemora with only a few feeble rugosities basally; protibial spur feeble; protarsi scarcely dilated.

Length 15 to 22.5 millimeters; width 3.5 to 6.

Type locality: Macassar, Celebes.

Distribution: Celebes.

Celebes: ♂, ♀, no locality data [MCZ]. 3 ♂, 3 ♀, Tjamba [EFG, [RNHL]. ♀, Bua-Kraeng (*Fruhstorfer*) [ANSP]. ♂, Macassar [RNHL]. ♂, Samanga (*Fruhstorfer*) [ANSP].

30. *GNOMA PULVEREA XULLA* Dillon and Dillon, subsp. nov. Plate 2, fig. 3.

From the nymotypic form this one differs in having the macular pubescence entirely fulvous, and maculae more numerous and not confined to base and apex, the median fascia distinct, and sutural vitta much broader.

Type locality: Xulla-Besi, Malay Archipelago.

Holotype: Academy of Natural Sciences, Philadelphia. No. 8259.

The male type was collected by Doherty.

31. *GNOMA PULVEREA LOMBOKIA* Dillon and Dillon, subsp. nov. Plate 2, fig. 2.

From *P. xulla* it differs in having the sutural muscular vitta much broader and more broken, the median fascia is broader and composed of many maculae; the macular pubescence and that of the scutellum is yellowish-white instead of fulvous. The protibial spur is much larger and the profemora ventrally rugose along their full length.

Type locality: Hombok, Sunda Island.

Type: Academy of Natural Science, Philadelphia, No. 8258.

The male holotype was collected in April at an elevation of 2,000 ft. by H. Fruhstorfer.

32. *GNOMA PULVEREA SANGIRIA* Dillon and Dillon, subsp. nov. Plate 2, fig. 4.

Differs from nymotypic form in having the macular color ochraceous, the sutural vitta entire, lateral edges only irregular, the median fascia more distinct and maculae on apical quarter much more numerous.

Type locality: Taroena, Sarigir.

Type: In the collection of E. F. Gilmour.

The female holotype was taken by Mr. Doherty between March and April at an elevation of 2,000 ft.

33. *GNOMA CRUCIATA* Kirsch

Gnoma cruciata Kirsch, Mitteil. Zool. Mus. Dresden 2 (1877) 158.

"One of the smaller species, from the known ones of which it is easily distinguished by the coloring and maculation. Dark brown, on head nearly black, a small spot behind eye, antennal tubercles on inner side, and a line from inner edge of each eye to base, sparsely gray pubescent. Pronotum one and one-half times as long as wide, transversely rugose, before base and behind anterior margin somewhat constricted, on median line densely, on a line below sides thinly, whitish-gray pubescent. Scutellum and elytra with suture, a quite narrow, sharply defined crossband close to middle, and a spot mesad to the humeral tubercle, densely white tomentose. Elytra twice as long as pronotum, on base punctate, punctures toward middle sparser and

finer, behind cross-band quite free of punctures. On underside finely gray pubescent, the mesepimeria and mesepisterna more densely whitish pubescent. Length 16 millimeters; width $4\frac{3}{4}$. Mysore."

From the above translation of the original description it is apparent that *cruciata* is closely related to *vittaticollis* and, in fact, the latter may eventually have to be placed as a subspecies of the former.

34. *GNOMA VITTATICOLLIS* Aurivillius

Plate 2, fig. 7.

Gnoma vittaticollis Aurivillius, Ark. Zool. 25 15 (1923) 23, fig. 127; Schwarzer Senckenbergiana 9 (1929) 372, figs. 25, 26; Breuning, Nov. Ent., Suppl. 3 2 (1945) 531.

Male.—Slender; fuscous, elytra sometimes slightly paler; entirely finely brown pubescent, denser on elytra. Head above with a median vitta, a vitta behind eye and front, yellow or yellowish-white. Pronotum with five vittæ of same color, one medially, one laterally and one above procoxae. Scutellum entirely yellow or yellowish-white tomentose. Elytra with a common sutural vitta to middle, a narrow fascia at middle and reticulate maculae on basal and apical quarters of same color pubescence as pronotum and head. Beneath fuscous or dark reddish-brown with thin, fine, gray pubescence, a macula on mesosternal sidepieces, metasternum laterally, mesepisterna and a broad vitta laterally on sternites of yellowish pubescence, a transverse macula of dark brown on base of each sternite laterally. Legs fuscous or dark reddish-brown, tibiae somewhat paler; thinly gray pubescent. Antennae dark reddish-brown, third segment with basal two-thirds, fourth and remaining segments pale gray annulate.

Head above finely alutaceous; front as head above and with coarse, scattered punctures, these more numerous and deeper on bases of antennal tubercles. Pronotum slightly more than twice as long as wide; disk transversely multicarinate, the carinae of apex less regular and inclined to curve medially. Elytra with sides broadly arcuate, attenuate apically; apices each narrowly rounded; disk with basal quarter granulate-punctate, the granules slightly squamiform; thence to middle coarsely, moderately closely punctate, to apex punctures finer. Mesosternum with large, elongate, rounded tubercle at middle of process, apex narrowly rounded; apex of fifth sternite emarginate. Profemora not rugose; protibiae not serrate, spur feeble. Antennae about twice body length; scape attaining pronotal apex, surface

finely densely punctate, with coarser, punctures interspersed; third segment two and one-half to four times length of scape, finely densely punctate; seventh pencilled at apex; eleventh longer than tenth, aciculate at apex.

Female.—Identical to male in coloring; more robust; pronotum slightly longer than wide, with a distinct curved sulcus at apical quarter; fifth sternite broadly arcuate at apex; antennæ about one and one-half times body length, seventh segment not pencilled; protibiæ lacking spur.

Length 9 to 24 millimeters; width 3.5 to 7.

Type locality: S. W. Borneo: Pengaron.

Type in Naturhistoriska Riksmuseum, Stockholm.

Distribution: Borneo, Philippines.

Borneo: 2 ♀, no locality data [RNS—allotype and paratype] ♂;

Pengaron, Martopoera, S. W. Borneo [RNS-type]. ♂,

Pontianak (*F. Muir*) [USNM]. ♂, Brunei, N. Borneo (*Waterstradt*) [ANSP-Paratype].

Philippines: ♂, Baguio (*G. G. Haslam*) [USNM].

The Philippine specimen differs in having the elytral sutural vitta and the median fascia narrower, the reticulate maculae at apex and base are fewer, and there is a tendency for a short vitta at suture to appear apically. Because there is only one specimen, no attempt is made to distinguish subspecies.

ILLUSTRATIONS

PLATE 1

- FIGS. 1, 2. *G. zonaria* Linn. ♂, ♀. X 2.5
3, 4. *G. affinis* Guérin. ♂, ♀. X 3
5, 6. *G. Affinis blanchardi* Breuning ♂, ♀. X 3
7, 8. *G. agroides* Thomson. ♂, ♀. X 2.2
9, 10. *G. admirala admirala* sp. nov. ♂, ♀. X 2.4
11, 12. *G. admirala pallida* subsp. nov. ♂, ♀. X 2.4
13, 14. *G. uniformis* sp. nov. ♂, ♀. X 2.8
15, 16. *G. gelvinka* sp. nov. ♂, ♀. X 2.6
17, 18. *G. boisduvali* Plavil. ♂, ♀. X 2.8

PLATE 2

- FIG. 1. *G. pulverea pulverea* Pascoe. X 2.6
2. *G. pulverea lombokia* subsp. nov. X 2.6
3. *G. pulverea xulla* subsp. nov. X 2.6
4. *G. pulverea sangirea* subsp. nov. ♀. X 2.6
5. *G. jugalis meridionalis* Schwarzer. X 2.8
6. *G. jugalis samar* subsp. nov. 2.8
7. *G. vittaticollis* Aurivillius. X 2.5
8. *G. luzonica luzonica* Erichon. X 3
9. *G. luzonica insulana* Schwarzer. X 3
10. *G. luzonica bilaris* subsp. nov. X 3.3
11. *G. suturifera suturifera* Schwarzer. X 3
12. *G. suturifera fasciata* subsp. nov. X 3
13. *G. longicollis longicollis* Fabricius. X 2.5
14. *G. longicollis dispersa* Pascoe. X 2.5
15. *G. longicollis sumatrensis* subsp. nov. X 2.8
16. *G. sticticollis* Thomson. X 2.4
17. *G. gilmouri* sp. nov. X 3.2
18. *G. Sublaevifrons* Schwarzer. X 2.6

PLATE 3

- FIG. 1. *Gnoma thomsoni* sp. nov. X 2.8
2. *Imantocera penicillata* Hope. X 3.2
3. *I. sumbavana* Breuning, X 3
4. *I. vicina* Gahan. X 3.3
5. *I. plumosa acmocerooides* Thomson. X 3.4
6. *I. plumosa plumosa* Olivier. X 3.2
7. *I. niasensis niasensis* Breuning. X 3
8. *I. niasensis dejongi* subsp. nov. X 2.8
9. *I. grisescens* sp. nov. X 3
10. *Psectrocera plumigera* Westwood. X 3

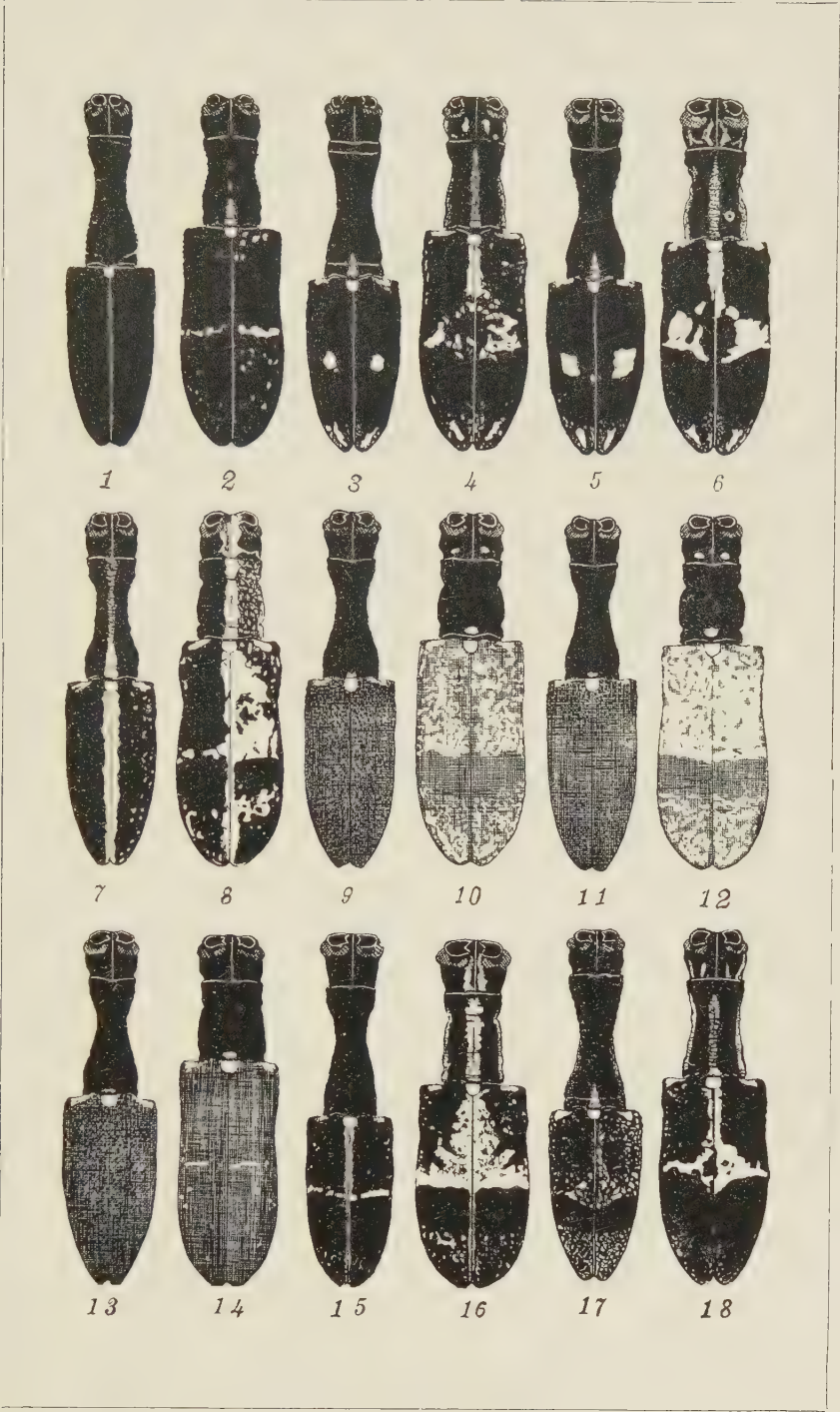


PLATE 1.

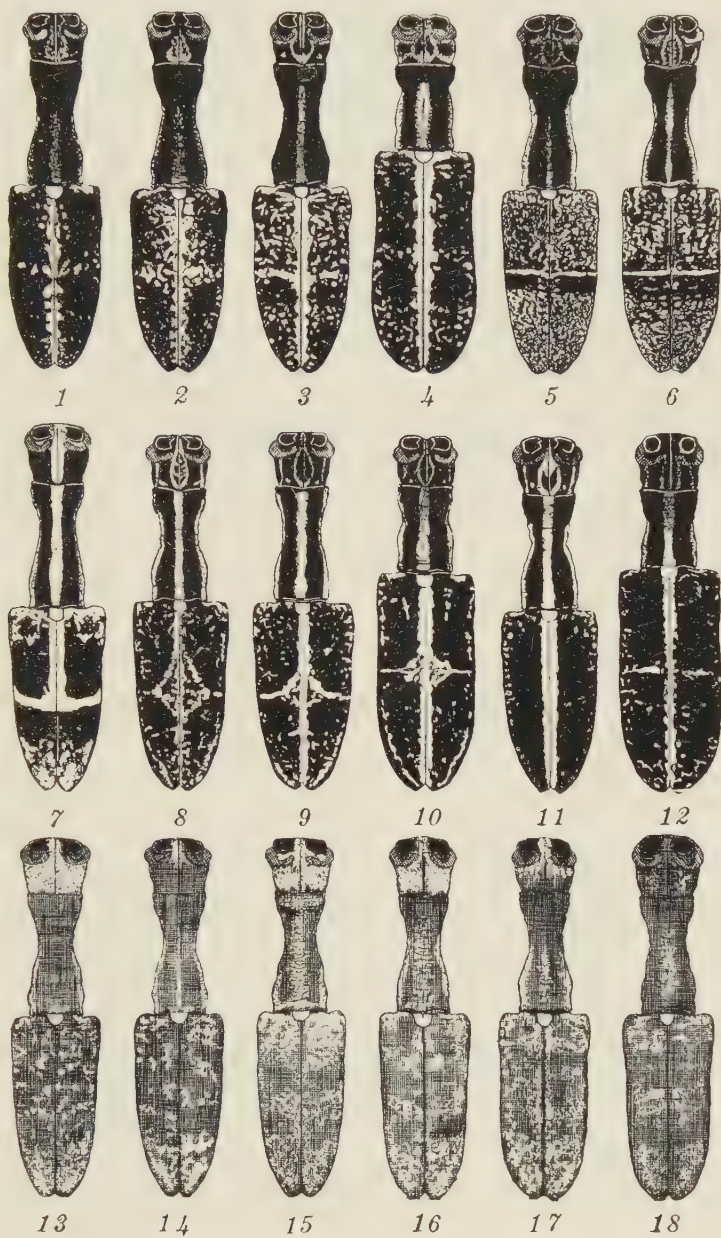


PLATE 2.



PLATE 3.

STRUCTURE AND DEVELOPMENT OF THE FEMALE GAMETOPHYTE IN CROTALARIA INTERMEDIA KOTSCHY.

BY ASOKA KUMAR PAUL and ROBINDRA MOHON DATTA

Of the Jute Agricultural Research Institute, Hoogly, W. Bengal, India.

ONE PLATE

INTRODUCTION

Crotalaria intermedia Kotschy, is a native of tropical Africa growing wild in the Nile land and lower Guinea.

The seeds of this plant were brought and grown in Bengal in 1936 with a view to see any economic possibilities.

Unless the life-history and the cytology of the plant are fully studied, no careful experiment can be planned and carried out. With that end in view, the present work was undertaken in 1936.

PREVIOUS WORK

Embryological studies on the genus *Crotalaria* were not done so far exhaustively. Cook¹ first studied the development of seed in *C. sagittalis* and described a few details of its embryogeny. He found a massive haustorial suspensor in the embryo. Samal², however, described the development of ovule, female gametophyte, embryo and endosperm of *C. juncea* and found the normal type of monosporic 8-nucleate embryosac. The suspensor was found to be massive and haustorial. Endosperm formation is free nuclear at first and wall formation takes place centripetally later on. He also studied the pollen tube growth and the cause of sterility in a large number of ovules due to the failure of pollen grains sending out the tubes and the occasional degeneration of the functional megaspore in the off-season.

MATERIAL AND METHODS

The materials were fixed mostly on sunny days between 11 a.m. and 1 p.m., and 2 p.m. and 3 p.m. in the months of June and July, 1936 from the plants grown in several culture pots. Fixation was done in Allen's modification of Bouin's fluid, Flemming's weak and Navashin; the best results were obtained

with Navashin and Allen's Bouin. The usual procedure was followed. Sections were cut at 10–22 μ . in thickness to get the desired stages and stained with iron-haematoxylin and gentian violet.

OBSERVATIONS

The superior monocarpellary ovary bears on its marginal placenta one row of ovules. Their number varies from 11 to 14, though Oliver³ says it to be 20 to 30 seeded from his materials collected from tropical Africa. These are arranged closely enclosing all the space of the ovarian chamber and crowded together on the placenta in the young condition at first. But with the growth and enlargement of the carpel, they become separated from one another and also from the ovarian wall.

The ovule initials arise as protruberances on the placenta and consist of homogeneous cells at first. The primordia of the integuments arise exogenously as annular rings at the base of the nucellar tissue in acropetal succession and the nucellar epidermis only takes part in their formation. Gradually by the cell division in the integuments they become thick and are observed to be 3- to 4-layered in case of the inner integument and the outer integument is composed of more than 3 to 4 layers of cells especially near the micropyle. The growth of the inner integument is not as vigorous as that of the outer one, though the growth of the latter is initiated earlier. Gradually the latter overtakes the inner one and forms the micropyle. The mature ovule ultimately becomes anatropous and bitegmic, before any meiotic division takes place in the megaspore mother cell.

The archesporium is hypodermal in origin and is observed to be differentiated in the second and third layers of the nucellar tissue as a polygonal cell of comparatively large dimensions with thicker and denser cytoplasm and relatively large nucleus and is not always strictly confined to a single cell. Often, two such archesporial cells have been observed to lie side by side (Fig. 1), though Samal⁶ observed in *C. juncea* a single archesporial cell differentiating in the third layer of the nucellus, which either directly functions as a megaspore mother cell or cuts off a parietal cell before doing so. In a single instance, four archesporial cells, lying side by side, have been observed to develop into four megaspore mother cells. Further, in this material no parietal cell is seen to be cut off and the archesporium acts and functions directly as a megaspore mother cell.

The megaspore mother cell then undergoes a period of rest, during which it is pushed inwards by the periclinal divisions

of the outer over-lying nucellar tissues. As a result, the megaspore mother cell is observed to be in the 4th or 5th layer of the nucellus during the heterotypic division as is observed in *C. juncea* ⁶. In the resting stage the nucleus contains one conspicuous nucleolus embedded in the chromatin network. The general cytoplasm is much vacuolated containing 3 or 4 bigger vacuoles in addition to numerous smaller ones. (Fig 2). So far, in case of the multiple archesporium, only one of them was seen to develop into a functioning megaspore mother cell. On completing the reduction division, a cell plate is formed near about the central region of the cell, thus dividing it and forming thereby two dyads. In some cases, the lower dyad is a little bigger. The second divisions do not follow simultaneously in both the cells, although after division there is the resulting tetrad of four megaspores. When the division in the upper dyad is in the anaphasic stage, the division in the lower dyad is observed to start. The spindles are pointed in appearance. The homotypic spindles do not lie parallel to the long axis of the ovule nor at right angles to each other. The upper spindle is somewhat oblique. After completion of the divisions and proper development and necessary growth of the respective spores, an oblique "T"-shaped tetrad is organized (Fig. 3). Such a type of tetrad was recorded by Samal ⁶ also. The four megaspores, thus formed, differ in size and shape. The middle pair is the smallest; the uppermost (micro-pylar) intermediate; and the lowest (chalazal) the largest of all. Later on, the upper three megaspores show various types of contraction leading to ultimate degeneration, while the chalazal one alone functions. These three upper cells after complete degeneration and disintegration are observed as dark-staining shapeless masses covering and capping the functional and developing megaspore. In a particular case, even after degeneration, "T"-shape is not lost (Fig. 4).

The active megaspore gradually increases in size and elongates considerably. It is somewhat pointed at the basal end and broad at the apex. Its nucleus does not divide until the cell increases 2 to 3 times in volume. In course of growth and development, it crushes some adjacent nucellar tissues, which degenerate. These are observed as dark-staining shapeless islands surrounding the developing spore. It is much vacuolated and its nucleus is lying in the center. Afterwards, the nucleus of the fully developed megaspore divides into two daughter nuclei near about the center. These two daughter nuclei move

and migrate towards the opposite poles, being inter-connected by the protoplasmic strands and the 2-nucleate sac is filled with numerous vacuoles, some big and some small. (Fig. 5). These two nuclei again divide to form the 4-nucleate stage, where the central vacuole becomes very prominent (Fig. 6). The divisional spindles are not parallel to the longitudinal axis of the cell but they lie somewhat obliquely; spindles are pointed. These four nuclei again divide simultaneously to reach the eight-nucleate stage of the sac (Fig. 7); the quartet being noticed at each pole with a bigger vacuole in the center. The micropylar end enlarges and becomes broader and the lower end is a little tapering, as reported by the writers (4) in a note.

Simultaneously with the organization of the egg-apparatus and the antipodals, one nucleus from each pole migrates away and meets each other. They lie side by side about the upper as well as the central region of the sac. The process of fusion is very slow just as in *C. juncea*⁶. Eight nucleate stage with two unfused polars are found usually two or three days before anthesis.

After the maturity of the embryo-sac, the volume no doubt increases but the surrounding nucellar tissues are not found to be crushed out nor the sac comes in contact with the cells of the integument as recorded by Samal⁶.

The synergids are pyriform with vacuoles at their bases and the slightly elongated egg lies just a little below them. The egg is not, however, vacuolated (Fig. 8). No filiform apparatus in the synergids is noticed.

After polar fusion the secondary nucleus increases in size at least two times.

The mature embryo-sac is not cylindrical. The three antipodal cells are practically cut off and separated; they are later observed in the wedge-shaped basal groove, where they disorganize along with the tubular portion of the sac before fertilization and the embryo-sac is seen rounded at the chalazal end. Reeves⁵ found in *Medicago sativa* a partial disorganization of the chalazal groove with antipodals. Samal⁶, however, records complete disorganization before fertilization. The early disorganization of the antipodals before fertilization corroborates the findings of Guignard², who holds that the antipodals persist for a long time in the Mimosoideae and Caesalpinioideae but they degenerate earlier in the Papilionatae.

SUMMARY

1. The ovule is anatropous and bitegmic.
2. More than one archesporial cell are observed, which are hypodermal in origin. Only one develops. It directly acts as a megaspore mother cell without cutting off any parietal cell.
3. The megaspore mother cell after reduction division forms an oblique "T"-shaped tetrad of megaspore; the chalazal one becomes functional.
4. The mature embryo-sac is 8-nucleate and is of monosporic eight-nucleate (normal) type.
5. The antipodals occur as cells and degenerate early before fertilization.

ACKNOWLEDGEMENT

In the end, we wish to record our grateful thanks to Dr. S. K. Mukherjee, Curator of the Herbarium, Royal Botanic Gardens, Sibpur, Calcutta, for information about the systematics of this plant.

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ILLUSTRATIONS

[The figures were drawn with the aid of a camera lucida at the drawing board level. The magnification is given along with each figure.]

PLATE I

- FIG. 1. Two archesporial cells, one bigger than the other, in the hypodermal region of the nucellus. X 150.
2. Megaspore mother cell developing. X 1600.
3. An oblique "T"-shaped tetrad of megaspores. X 1600.
4. Degeneration of the three megaspores forming "T"-shaped and blackened mass at the top. X 1600.
5. Binucleate embryo sac with degenerated megaspores at the top. X 1600.
6. Four-nucleate embryo sac. X 1600.
7. Eight-nucleate embryo sac. X 1600.
8. Two synergids with the egg and the secondary nucleus just below the egg. Ca. X 200.

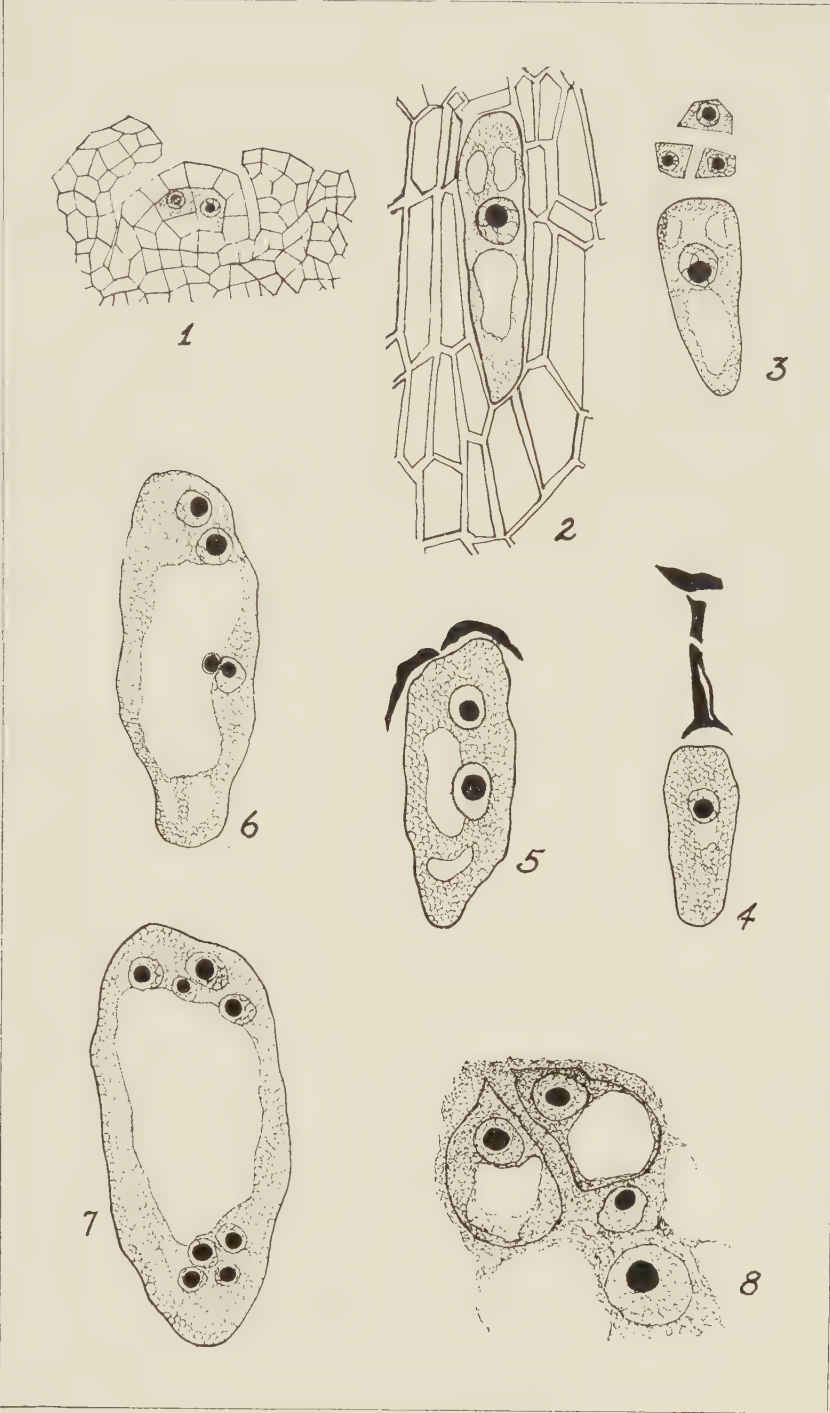


PLATE 1.

STUDIES ON THE CONTROL OF FECAL-BORNE DISEASES IN NORTH CHINA. XV. AN APPROACH TO THE QUANTITATIVE STUDY OF THE HOUSE FREQUENTING FLY POPULATION. C. THE CHARACTERISTICS OF A RURAL FLY POPULATION *.

BY CH'ING HUA MENG and GERALD F. WINFIELD

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INTRODUCTION

In the first of this series of papers on an approach to the quantitative study of the house frequenting fly population (Meng and Winfield, 1941) a method of utilizing trapping for enumerating the fly population was presented. In the second paper the characteristics of an urban fly population as shown by the application of this method was reported (Meng and Winfield, 1941a). In this paper the results of using it in the study of the fly population of a rural area will be presented.

MATERIALS AND METHODS

The rural area studied is located about 22 miles to the east of Tsinan and consisted of the market town of Lungshan and three nearby villages. Trappings were carried out from May to September of 1937 in 18 stations in Lungshan, Hu Chung P'o, Tung Hsu Ma, and Ya Chuang. The stations can be briefly characterized as follows:

Indoor stations (Living rooms)

- Station 1. A dirty home in Hu Chung P'o.
- Station 2. A clean home in Hu Chung P'o.
- Station 3. A clean home in Hu Chung P'o.
- Station 4. A clean home in Tung Hsu Ma.
- Station 5. A dirty home in Tung Hsu Ma.
- Station 6. A clean home in Ya Chuang.
- Station 7. A clean home in Ya Chuang.
- Station 8. A clean home in Lungshan.
- Station 9. A dirty home in Hu Chung P'o.

Outdoor stations (Courtyards)

- Station 10. A clean court in Hu Chung P'o.
- Station 11. A dirty court in Hu Chung P'o.
- Station 12. A Clean court in Hu Chung P'o.

* This study was financed by the Rockefeller Foundation.

- Station 13. A clean court in Tung Hsu Ma.
Station 14. A clean court in Tung Hsu Ma.
Station 15. A clean court in Ya Chuang.
Station 16. A clean court in Ya Chuang.
Station 17. A dirty court in Hu Chuang P'o.
Station 18. A dirty court in Lungshan.

With the exception of Station 1, which consisted of two rooms, all of the indoor stations consisted of three rooms. The light in all stations was not strong, as is the case with the rural homes in North China. Few flies were observed in the rooms during the several visits made by one of us (Meng). Some of the comparisons of the relative cleanliness of the rooms and courts are indicated by the words "dirty" and "clean". Even the clean stations would not measure up to modern standards of cleanliness though a few may have approached it. All the outdoor stations were much alike except Station 18 which was the courtyard of a pork-shop in which pigs were kept.

The trappings and calculations of the density indices were carried out as described in the preceding paper (Meng and Winfield, 1941a). One important modification which may have affected the results should be noted. In order to protect the tent traps used in the outdoor stations from being upset by dogs and other animals, it was necessary to hang them against the courtyard wall. To do this, wooden bottoms were fastened to the legs of the traps. The bait was set on these bottoms. As the traps were hung against the wall flies could approach the bait from only three sides instead of four as was the case with traps on the ground. This may have resulted in a smaller catch of flies.

PRESENTATION OF DATA

During the course of the five months of trapping, traps remained in place in the 18 stations for a total of 10,184 day light trapping hours with a total of 101,481 flies caught. Of this number, 24,545 were classified as shown in Table 1. The great majority of the flies taken were trapped in the outdoor stations. The percentages shown in Table 1 are the percentages of flies actually caught and classified. Of the total catch 17.7 per cent were *Musca vicina*, 32.2 per cent were *Chrysomya megacephala*, and 50.1 per cent belonged to the *Other species group* which was made up of the different species listed in the table. Some 11.6 per cent of the catch belonged to rare or wild species which are of no importance to public health and so were left unclassified.

TABLE 1.—Showing the number and percentage belonging to each species of flies trapped in 18 trapping stations in Lungshan area between May and September, 1937.

	All stations	Indoor stations	Outdoor stations
Station numbers -----	1-18	1-9	10-18
Type of trap used -----	Clock and tent	Clock	Tent
Total number of daylight trapping hours -----	10.184	4.943	5.241
Total number of flies caught -----	101,481	3,968	97,513
Total number of flies classified -----	24,545	3,907	20,638
Percentage of classified flies:			
<i>Musca vicina</i> -----	17.7	95.5	14.5
<i>Chrysomya megacephala</i> -----	32.2	1.5	33.4
Other species group -----			
<i>Muscina stabulans</i> -----	9.7	0.5	10.1
Genus <i>Sarcophaga</i> -----	10.1	0.2	10.6
<i>Lucilia sericata</i> -----	12.2	1.9	12.6
Miscellaneous species group -----			
<i>Lucilia caesar</i> -----	4.5	0.1	4.7
<i>Musca sorbens</i> -----	0.4	0.0	0.4
<i>Musca hervei</i> -----	1.4	0.0	1.4
<i>Aldrichiella</i> and <i>Calliphora</i> -----	0.1	0.0	0.1
<i>Stomoxys calcitrans</i> -----	0.1	0.0	0.1
Unidentified -----	11.6	0.3	12.2
Group total -----	18.1	0.4	18.9
Group total -----	50.1	3.0	53.1

The fly density indices and the corrected percentages calculated from them for all of the 18 stations are shown in Table 2. These indices show the average number of flies caught per daylight trapping hour for the entire five months of the trapping period.

TABLE 2.—Showing the general and specific fly density indices and the corrected percentages of flies belonging to the various species and groups caught in each station of the Lungshan area during May to September, 1937.

A.—Indoor stations living rooms

Station number	Type of station	Fly density index							
		All flies	<i>Musca vicina</i>	<i>Ch. megacephala</i>	Other species group				
					Group total	<i>Mu. stabulans</i>	Genus <i>Sarcophaga</i>	<i>Lucilia sericata</i>	Miscellaneous
1 -----	Dirty -----	20.8	20.4	0.20	0.20	0.08	0.06	0.00	0.06
2 -----	Clean -----	7.8	7.8	0.00	0.00	0.00	0.00	0.00	0.00
3 -----	Clean -----	7.5	6.7	0.36	0.41	0.03	0.20	0.00	0.13
4 -----	Clean -----	26.9	26.2	0.50	0.22	0.00	0.18	0.04	0.00
5 -----	Dirty -----	44.5	44.3	0.15	0.00	0.00	0.00	0.00	0.00
6 -----	Clean -----	34.8	28.4	1.72	4.71	0.47	3.82	0.11	0.31
7 -----	Clean -----	10.7	10.5	0.06	0.12	0.00	0.12	0.00	0.00
8 -----	Clean -----	7.9	7.5	0.20	0.23	0.03	0.05	0.00	0.15
9 -----	Dirty -----	19.5	18.4	0.55	0.56	0.04	0.29	0.10	0.13
Room index -----		20.0	18.9	0.41	0.72	0.07	0.53	0.03	0.09

A.—Indoor stations living rooms—Continued

Station number	Type of station	Corrected percentages						
		<i>Musca vicina</i>	<i>Ch. mega-cephala</i>	Other species group				
				Group total	<i>Mu. stambulans</i>	Genus <i>Sarco-phaga</i>	<i>Lucilia sericata</i>	Miscellaneous
1	Dirty	98.1	0.95	0.95	0.38	0.29	0.00	0.28
2	Clean	100.0	0.00	0.00	0.00	0.00	0.00	0.00
3	Clean	89.7	4.82	5.47	0.40	2.67	0.00	2.40
4	Clean	97.3	1.88	0.82	0.00	0.67	0.15	0.00
5	Dirty	99.7	0.30	0.00	0.00	0.00	0.00	0.00
6	Clean	81.5	4.98	13.52	1.35	10.97	0.31	0.89
7	Clean	98.3	0.57	1.13	0.00	1.13	0.00	0.00
8	Clean	94.6	2.50	2.90	0.38	0.62	0.00	1.90
9	Dirty	94.3	2.83	2.87	0.20	1.49	0.51	0.67
Room index		94.4	2.00	3.60	0.35	2.65	0.15	0.45

B.—Outdoor stations, courtyards

Station number	Type of station	Fly density index							
		All flies	<i>Musca vicina</i>	<i>Ch. mega-cephala</i>	Other species group				
					Group total	<i>Mu. stambulans</i>	Genus <i>Sarcophaga</i>	<i>Lucilia sericata</i>	Miscellaneous
10	Clean	123.7	3.2	57.1	63.4	11.8	13.5	7.9	30.2
11	Dirty	244.0	8.8	122.8	112.4	19.1	39.5	16.8	37.0
12	Clean	125.7	2.2	8.7	74.8	8.9	23.0	12.1	30.8
13	Clean	162.4	17.7	60.0	84.7	7.7	53.1	21.6	47.6
14	Clean	501.7	19.9	267.4	214.4	16.3	53.1	21.0	124.0
15	Clean	473.2	10.6	215.4	247.2	51.6	54.3	22.5	113.6
16	Clean	718.0	6.2	269.8	442.0	57.7	111.1	41.3	231.9
17	Dirty	525.4	20.0	307.4	197.8	32.6	65.3	23.3	71.6
18	Dirty	709.4	175.1	374.1	160.2	19.2	103.4	4.7	32.9
Court index		398.4	29.3	191.6	177.5	25.0	53.6	18.4	80.5

Station number	Type of station	Corrected percentages						
		<i>Musca vicina</i>	<i>Ch. mega-cephala</i>	Other species group				
				Group total	<i>Mu. stambulans</i>	Genus <i>Sarco-phaga</i>	<i>Lucilia sericata</i>	Miscellaneous
10	Clean	2.6	46.2	51.2	9.5	10.9	6.4	24.4
11	Dirty	3.6	50.3	46.1	7.8	16.2	6.9	15.2
12	Clean	1.7	38.8	59.5	7.0	18.3	9.7	24.5
13	Clean	10.9	37.0	52.1	4.8	11.5	6.5	29.8
14	Clean	4.0	53.3	42.7	3.2	10.6	4.2	24.7
15	Clean	2.2	45.6	52.2	10.9	11.5	4.8	25.0
16	Clean	0.9	37.5	61.6	8.0	15.5	5.8	32.3
17	Dirty	3.8	58.5	37.7	6.3	12.4	5.4	13.6
18	Dirty	24.7	52.7	22.6	2.7	14.6	0.7	4.6
Court index		7.3	47.9	44.8	6.4	13.4	4.6	20.4

C.—All stations, living rooms and courts

Station number	Type of station	Fly density index							
		All flies	<i>Musca vicina</i>	<i>Ch. mega-cephala</i>	Other species group				
					Group total	<i>Mu. stambulans</i>	Genus <i>sarcophaga</i>	<i>Lucilia sericata</i>	Miscellaneous
Area index -----		209.2	24.1	96.0	89.1	12.5	27.0	9.2	40.4

C.—All stations, living rooms and courts—Continued

Station Number	Type of station	Corrected percentages						
		<i>Musca vicina</i>	<i>Ch. megacephala</i>	Other species group				
				Group total	<i>Mu. stambulans</i>	Genus <i>Sarcophaga</i>	<i>Lucilia sericata</i>	Miscellaneous
Area index.....		11.6	46.0	42.4	6.0	13.0	4.4	19.0

The highest density index in any of the nine indoor stations was that of Station 5 where a general density index of 44.5 was recorded. This station was classified as being "dirty" and was located in the village of Tung Hsu Ma. On the other hand the next highest index of 34.8 was in Station 6 which was reported as "clean" and was located in Ya Chuang. The lowest index for any of the indoor stations was 7.5 for Station 3. The average general fly density index for all the rooms was 20.0.

By far the most important species caught in houses, as was the case in the Tsinan area (Meng and Winfield, 1941a), was *Musca vicina*. The highest index for this species was 44.3 and the lowest was 6.7 while the index for all nine stations was 18.9. *Chrysomyia megacephala* was taken in 8 out of the 9 stations but its density was very low with an average of only 0.41 for the nine stations. The numbers of the *Other species group* in these rural rooms was also low with an average of only 0.72 for all stations. One station (No. 6) showed an index of 4.71.

The overwhelming importance of *Musca vicina* within the houses is best shown by the corrected percentages. In one station (No. 2) 100 per cent of the flies belonged to this species while in only two stations (Nos. 3 and 6) the percentage fall below 94 per cent. For the nine stations 94.4 per cent of the flies caught were *Musca vicina*. In two stations (Nos. 3 and 6) *Chrysomyia megacephala* made up more than 4 per cent of the flies while in two others (Nos. 8 and 9) it made up more than 2 per cent. In the other five stations this species accounted for from none to 1.88 per cent of the flies present. The average for all nine stations was 2.00. The *Other species group* was represented in 7 of the 9 stations. It was most numerous in Station 6 where it made up 13.52 per cent of the flies present with an average of 3.6 per cent in all the stations. The most important species in this group were those belonging to the Genus *Sarcophaga*

since they made up 2.65 per cent of the flies present in the nine stations.

The general density indices for the outdoor stations run much higher than do those of the indoor ones, as was the case in the urban area. The index for all species ranged from high consisting of 718.0 in Station 16 to low consisting of 123.7 in Station 10, with an average of 398.4. The specific indices for the different species and groups varied much more than was the case with the indoor stations. *Musca vicina* was present in all stations with the highest density for this species of 175.1 in Station 18 and lowest with 2.2 in Station 12. The average density for all stations was 29.3, which is somewhat higher than its density in the indoor stations. If the one station with high density is removed then the average index for the remaining eight is only 11.2 which is considerably below that of the indoor stations. It will be remembered that Station 18 which showed a high *Musca vicina* index was the courtyard of a pork-shop where pigs were kept. The fact that pig manure is the best breeding medium for this species, as we shall show in the succeeding paper of this series, fully accounts for this abnormally high *vicina* index in this station. This data would indicate that the density of this species in the houses of the Lungshan area is probably greater than it is in the courtyard except when special conditions as in Station 18 supervene.

The specific index of *Chrysomya megacephala* varied from 374.1 in Station 18 to 48.7 in Station 12 with an average of 191.6 for the nine stations. This average index was the highest for any of the species or groups present though the *Other species group* was a close second with an average index of 177.5. This latter group showed a higher index in the station with its maximum number (Station 16 with an index of 442.0) than the station showing the maximum *Chrysomya megacephala* index had. The lowest index for the *Other species group* was 63.4 in Station 10. Within the *Other species group* the *Miscellaneous group* was most abundant with an average index for the nine stations of 80.5. The Genus *Sarcophaga* came second with an average index of 53.6. *Muscina stabulans* had an average index of 25.0 while *Lucilia sericata* had an average index of 18.4.

The relative importance of the different species is shown by the corrected percentages. *Musca vicina* made up 24.7 per cent of the flies in Station 18 and 10.9 per cent of the flies

in Station 13 but did not exceed 4 per cent in any of the other stations. It had an average of 7.3 per cent in all nine stations. *Chrysomyia megacephala*, on the other hand, made up from 37.0 to 58.5 per cent of the flies in the different stations and with an average of 47.9 per cent for the nine. The *Other species group* ranged from 61.6 to 22.6 per cent with an average of 44.8. Within this group the *Miscellaneous group* accounted for 20.4 per cent of all flies present in all stations, with the Genus *Sarcophaga* accounting for 13.4 per cent *Muscina stabulans* for 6.4 and *Lucilia sericata* for 4.6 per cent.

The way in which the density indices in the outdoor and indoor stations compare with each other for the four villages is shown in Table 3 (A). The outdoor population showed a density which ranged from about 10 times as great as that of the indoor stations in Tung Hsu Ma to almost 100 times

TABLE 3.—Comparisons of fly density indices and corrected percentages of flies belonging to the three main groups for different classes of stations. (Lungshan, June to September, 1937.)

Classes of stations	General density index	Musca vicina		Chrysomyia megacephala		Other species group	
		Index	Per cent	Index	Per cent	Index	Per cent
A.—Living rooms and courtyards compared							
a. Hu Chung P'o							
Rooms (1-3, and 9)-----	13.9	13.3	95.9	0.3	2.0	0.3	2.1
Courts (10-12, and 17)-----	254.7	8.6	3.4	134.0	52.6	112.1	44.0
Village index-----	134.3	11.0	8.2	67.1	50.0	56.2	41.8
b. Tung Hsu Ma							
Rooms (4 and 5)-----	35.6	35.2	98.8	0.3	0.9	0.1	0.3
Courts (13 and 14)-----	332.0	18.8	5.7	163.7	49.3	149.5	45.0
Village index-----	183.8	27.0	14.7	82.0	44.6	74.8	40.7
c. Ya Chuang							
Rooms (6 and 7)-----	22.7	19.4	85.5	0.9	3.9	2.4	10.6
Courts (15 and 16)-----	595.6	8.4	1.4	242.6	40.7	344.6	57.9
Village index-----	309.1	13.9	4.5	121.7	39.4	173.5	56.1
d. Lungshan							
Room (8)-----	7.9	7.5	94.6	0.2	2.5	0.2	2.9
Court (18)-----	709.4	175.1	24.7	374.1	52.7	160.2	22.6
Village index-----	358.6	91.3	25.5	187.1	52.2	80.2	22.3

B.—The four villages compared

a. Living rooms

Lungshan (8) -----	7.9	7.5	94.6	0.2	2.5	0.2	2.9
Hu Chung P'o (1-8, and 9) -----	13.9	13.3	95.9	0.3	2.0	0.3	2.1
Ya Chuang (6 and 7) -----	22.7	19.4	85.5	0.9	3.9	2.4	10.6
Tung Hsu Ma (4 and 5) -----	35.6	35.2	98.8	0.3	0.9	0.1	0.3
Room index -----	20.1	18.9	94.0	0.4	2.1	0.8	3.9

b. Courtyards

Hu Chung P'o (10-12, and 17) --	254.7	8.6	3.4	134.0	52.6	112.1	44.0
Tung Hsu Ma (13 and 14) -----	332.0	18.8	5.7	163.7	49.3	149.5	45.0
Ya Chuang (15 and 16) -----	595.6	8.4	1.4	242.6	40.7	344.6	57.9
Lungshan (18) -----	709.4	175.1	24.7	374.1	52.7	160.2	22.6
Court index -----	472.9	52.7	11.1	228.6	48.3	191.6	40.5

in Lungshan. The general index of the outdoor stations was 23 times that of the indoor stations. The relationship of the densities of the different species in the outdoor and indoor stations was much the same in all four villages except in Lungshan where *Musca vicina* was exceptionally abundant in the outdoor stations due to the special conditions already mentioned.

The range of variations in fly density and species composition among the four villages is shown in Table 3 (B). The number of stations trapped in each village differed with only one each of indoor and outdoor stations in Lungshan, two each in Tung Hsu Ma and Ya Chuang, and three each in Hu Chung P'o. The indices of the villages must not, therefore, be considered as equally representing the fly population present in them. The general index for the indoor stations ranged from 7.9 in Lungshan to 35.6 in Tung Hsu Ma while that for the outdoor stations ranged from 254.7 for Hu Chung P'o to 709.4 in Lungshan. In all four villages the population in the indoor stations was dominated by *Musca vicina* though in Ya Chuang a fair number of *Other species group* flies was present. In the outdoor stations only in Lungshan was *Musca vicina* very important while *Chrysomya megacephala* was the dominant species in all villages except Ya Chuang where the *Other species group* was the most important.

The month by month variations of the density and species make up of the fly population of the whole Lungshan area as shown by the average density index for all indoor and outdoor stations and the percentage of flies belonging to each of the important groups and species are shown in Table 4 and graphed in Figures 1 to 4.

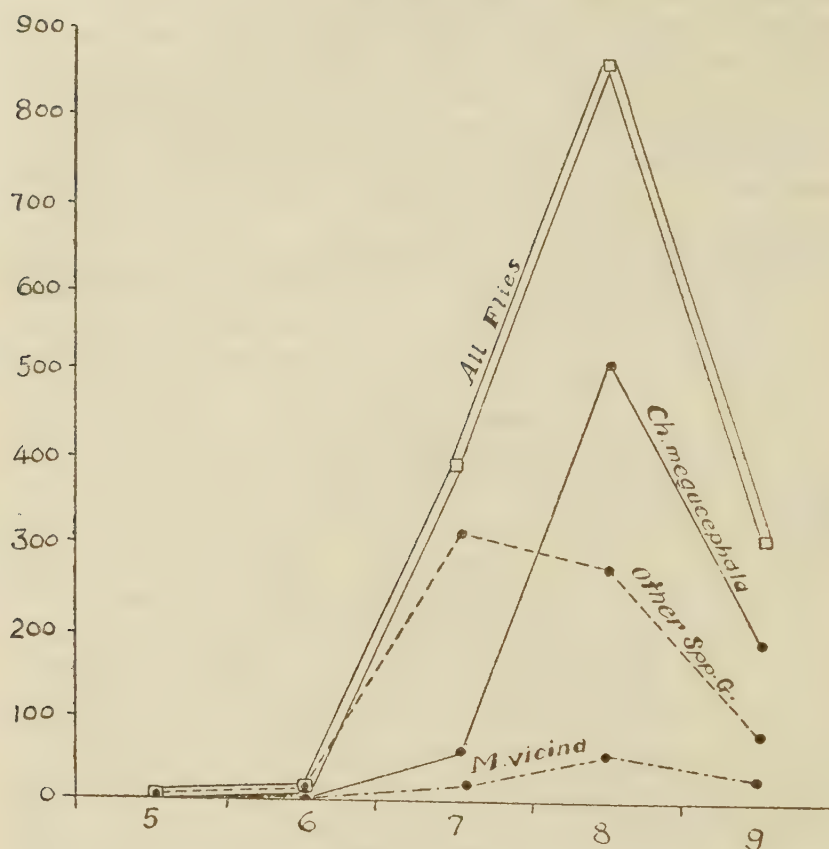
No flies were taken in the indoor stations during the months of May and June. The density of *M. vicina* was always relatively low, rising up through July to a peak of 42.3 in August [Tab. 4 (A)]. This compares with a peak of 95.6 for July in the indoor stations of the Tsinan area (Meng and Winfield, 1941a). In all months from 94 to 98 per cent of the flies belonged to this species while *Chrysomya megacephala* and the *Other species group* together made up the remaining portion.

TABLE 4.—Showing the mean fly density indices and the corrected percentages of all flies caught each month in the indoor and outdoor stations in the Lungshan rural area.

Month	Index of all flies	<i>Musca vicina</i>		<i>Chrysomya megacephala</i>		Other species group		
		Index	Per cent	Index	Per cent	Index	Per cent	
A.—Indoor stations								
May.....								
June.....								
July.....	8.7	8.4	98.0	0.1	0.8	0.2	1.3	
August.....	45.0	42.3	94.1	1.4	3.0	1.3	2.9	
September.....	25.4	24.8	98.6	0.3	1.0	0.3	0.4	
Other species group (Continued)								
	<i>Muscina Stabulans</i>		<i>Sarcophaga</i>		<i>Lucilia sericata</i>		Miscellaneous	
	Index	Per cent	Index	Per cent	Index	Per cent	Index	Per cent
May.....								
June.....								
July.....	0.1	0.9	0.0	0.0	0.1	0.2	0.01	0.12
August.....	0.2	0.4	0.2	0.4	0.9	2.1	0.01	0.02
September.....	0.1	0.1	0.1	0.1	0.1	0.1	0.03	0.00
B.—Outdoor stations								
May.....	1.3	0.0	0.0	0.0	0.0	1.3	100.0	
June.....	7.3	0.7	9.6	0.2	2.2	6.4	88.2	
July.....	399.1	24.2	6.0	63.7	15.9	311.2	78.1	
August.....	853.7	65.7	7.8	507.3	59.4	280.7	33.0	
September.....	306.2	26.6	8.8	194.4	63.5	85.2	27.7	
Other species group (Continued)								
	<i>Muscina Stabulans</i>		<i>Sarcophaga</i>		<i>Lucilia sericata</i>		Miscellaneous	
	Index	Per cent	Index	Per cent	Index	Per cent	Index	Per cent
May.....	0.2	12.7	1.0	74.6	0.0	0.0	0.2	12.7
June.....	2.5	34.0	1.3	17.9	0.8	11.6	1.8	24.7
July.....	71.4	17.9	89.1	22.3	52.4	13.1	98.3	24.8
August.....	24.0	2.8	61.7	7.2	34.7	4.1	160.3	18.8
September.....	3.8	1.2	16.3	5.3	6.0	1.9	59.1	19.3

In the outdoor stations flies were taken in all months between May and September. The general density index was highest in August when it reached 853.7 (Fig. 1). The comparable peaks for the Tsinan area occurred in September and reached 1,731.9 flies. *Musca vicina* appeared in the outdoor

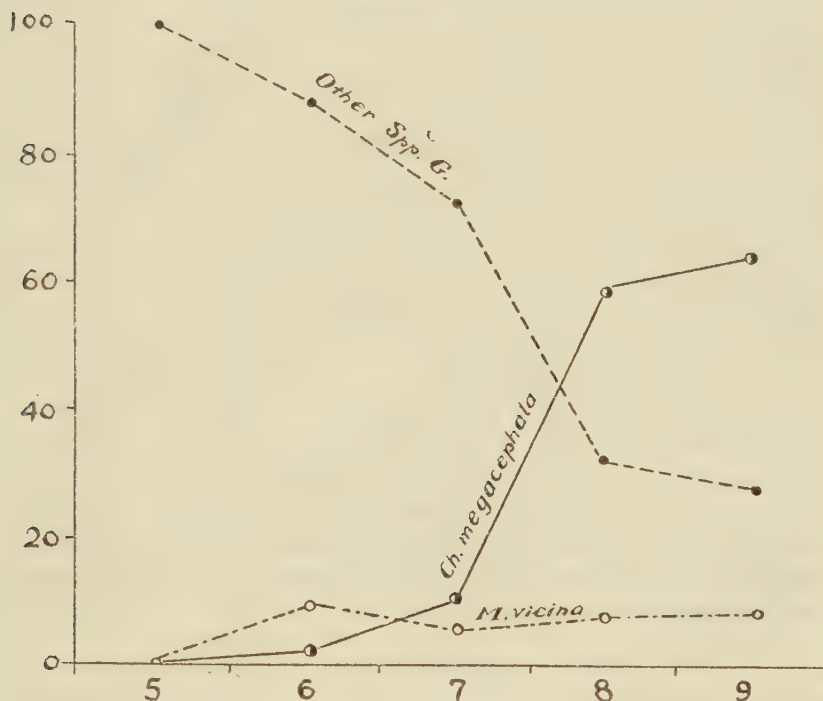
Figure 1



stations in June which was a month earlier than it was taken in the indoor stations. The density of this species reached a peak of 65.7 in August which was higher than the peak in indoor stations. It should be remembered that the exceptional conditions of Station 18 are largely responsible for this greater density of *M. vicina* in the outdoor stations. The Tsinan area peak for this species in the outdoor stations was 162.4 and also occurred in August. *M. vicina* was relatively most important in June when it made up 9.6 per cent of the flies in the outdoor stations (Table 4, fig. 2). The density of *Chrysomya megacephala* in this rural area paralleled its density in the Tsinan area since only a few adults were trapped in June, the number rose up through July to a peak of 507.3 in August. In Tsinan, however, the peak came in September and reached 1,480 flies. This was the most common species

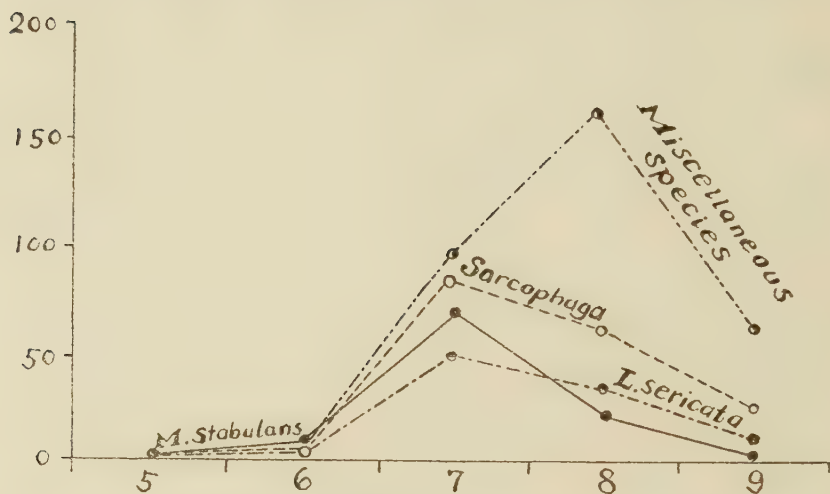
in August and September comprising 59.4 and 63.5 per cent of the population in these months respectively (Fig. 2).

Figure 2



The only flies caught in May in the outdoor stations belonged to the *Other species group*. The peak for this group reached 311.2 and occurred in July. The number present in August was only slightly smaller (Fig. 1). This single peak in July compares with a double peak for this group in the Tsinan area, one of 190.6 in June and the other of 179.0 in September. It is apparent, therefore, that this group is relatively more abundant in Lungshan than in Tsinan. This fact can be explained on the basis of what is known about breeding habits of the species in this group. (See below and succeeding paper in the series). The *Other species group* was the most common group present in May, June, and July (Fig. 2). The indices for the species composing the *Other species group* are shown in Figure 3. The *Miscellaneous group* which included the unidentified species was the most abundant with a peak of 160.3 in August. It was followed by the genus *Sarcophaga* with a peak of 89.1 in July. *Muscina stabulans* and *Lucilia*

Figure 3



sericata also show July peaks. The percentage of the population belonging to each of these species is shown in Figure 4. *Sarcophaga* made up the highest percentage in May, *Muscina stabulans* in June, and the *Miscellaneous* group in July, August, and September.

Figure 4



Comparisons of the fly population of the Lungshan rural area with that of the Tsinan urban area (Meng and Winfield, 1941a) are easily made by studying Table 5. The general density index for the indoor stations shows that the Tsinan area had a definitely larger fly population than did the Lungshan area during the months of June, July, and August but that in September the two populations were quite similar, with the Tsinan index being only slightly higher than the Lungshan one. In both areas, the dominant species of the indoor stations was *Musca vicina*, which made up over 93 per cent of the mean population, and it was considerably more dense in Tsinan particularly during June and July. The mean general density index, as well as the mean index of *Musca vicina*, for the urban area, was more than three times as great present in both areas but the indices were very low.

as that for the rural one. *Chrysomya megacephala* occurred in the indoor stations of both areas in small numbers, though the index for this species was considerably higher for Tsinan than for Lungshan. Similarly the *Other species group* was Lungshan only during the month of July while during May,

In the outdoor stations, the general index was higher in June, August, and September the Tsinan index was considerably higher. *Musca vicina* was more abundant in the Tsinan outdoor stations during all five months for which comparable data are available. *Chrysomya megacephala*, which was the dominant outdoor species in both areas, was more abundant in Lungshan only during July, while its density during June, August, and September was much greater in Tsinan than in Lungshan. The *Other species group* had a higher density index in Tsinan than in Lungshan during May, June, and September but was considerably higher in Lungshan in July and August.

Among this latter group, *Muscina stabulans*, Genus *Sarcophaga*, and *Lucilia sericata* were definitely more abundant in Tsinan outdoor stations during May, June, and September, while their density indices in July were decidedly greater in the rural than in the urban area. On the other hand, during the month of August, the density of *Muscina stabulans* was somewhat greater in Lungshan than in Tsinan; the index for *Sarcophaga* was slightly higher in Tsinan than in Lungshan; while that for *Lucilia sericata* was decidedly much higher in Lungshan than in Tsinan. The *Miscellaneous group* was more abundant in Tsinan outdoor stations during May and June

and was less abundant in this area during July, August, and September.

As shown in the penultimate line of Table 5 the mean density index of all flies in the outdoor stations as well as those of *Musca vicina* and *Chrysomyia megacephala* was decidedly higher in the urban than in the rural area, while, on the other hand, the density indices of the *Other species group* in outdoor stations of the two areas were almost equal. Among this latter group, the density indices of *Muscina stabulans* and *Sarcophaga* were definitely higher in Tsinan than in Lungshan; the indices for *Lucilia sericata* in the two areas were almost equal; while the mean index for the *Miscellaneous group* was decidedly much higher in the rural than in the urban area.

When the percentages of the mean indices shown in the last line of Table 5 is taken into account, it can be seen that both *Musca vicina* and *Chrysomyia megacephala* made up a higher percentage of the outdoor population in Tsinan than in Lungshan, while of those which belonged to the individual

TABLE 5.—Comparison of the fly population of the Tsinan urban area (T) for 1936 with that of the Lungshan rural area (L) for 1937.

Month	General density index		<i>Musca vicina</i> index		<i>Chrysomyia megacephala</i> index		Other species group index	
	T	L	T	L	T	L	T	L
A.—Indoor stations								
June	60.1	-----	59.3	-----	0.0	-----	0.8	-----
July	95.8	8.7	95.6	8.4	0.0	0.1	0.2	0.2
August	70.1	45.0	59.0	42.3	8.2	1.4	3.0	1.3
September	30.9	25.4	26.2	24.8	4.2	0.3	0.6	0.3
Mean	64.2	19.9	60.0	18.9	3.1	0.5	1.1	0.5
Percentage of mean	-----	-----	93.5	95.0	4.8	2.5	1.7	2.5

Month	General density index		<i>Muscina stabulans</i> index		<i>Genus sarcophaga</i> index		<i>Lucilia sericata</i> index		Miscellaneous species index	
	T	L	T	L	T	L	T	L	T	L
A.—Indoor stations (Continued)										
June	60.1	-----	0.28	-----	0.11	-----	0.32	-----	0.13	-----
July	95.8	8.7	0.13	0.1	0.00	0.0	0.05	0.1	0.04	0.01
August	70.1	45.0	0.63	0.2	1.81	0.2	0.32	0.9	0.21	0.01
September	30.9	25.4	0.38	0.1	0.13	0.1	0.02	0.1	0.05	0.0
Mean	64.2	19.9	0.35	0.1	0.51	0.1	0.18	0.3	0.11	0.1
Percentage of mean	-----	-----	0.51	0.5	0.75	0.5	0.27	1.5	0.16	0.05

B.—Outdoor stations

May	81.9	11.3	0.3	0.0	0.0	0.0	81.7	1.3
June	227.6	7.3	34.6	0.7	2.5	0.2	190.6	6.4
July	198.9	399.1	136.3	24.2	1.0	63.7	61.6	311.2
August	1,283.7	853.7	162.4	65.7	997.5	507.3	123.7	280.7
September	1,731.9	306.2	54.4	26.6	1,480.5	194.4	197.0	85.2
Mean	704.7	313.5	77.6	23.4	496.3	153.1	130.8	137.0
Percentage of mean			1.0	7.5	70.4	48.8	18.6	43.7

Month	General density index		<i>Muscina stabulans</i> index		Genus <i>sarcophaga</i> index		<i>Lucilia sericata</i> index		Miscellaneous species index	
	T	L	T	L	T	L	T	L	T	L

B.—Outdoor stations (Continued)

May	81.9	11.3	56.10	0.2	14.91	1.0	2.42	0.0	8.22	0.2
June	227.6	7.3	55.50	2.5	45.32	1.3	49.10	0.8	40.65	1.8
July	198.9	399.1	36.35	71.4	12.52	89.1	9.38	52.4	3.36	98.3
August	1,283.7	853.7	18.93	24.0	77.38	61.7	11.14	34.7	16.23	161.3
September	1,731.9	306.2	24.05	3.8	105.27	16.3	17.04	6.0	50.06	59.1
Mean	704.7	313.5	38.19	20.4	51.05	33.9	17.82	18.8	23.71	63.9
Percentage of mean			5.4	6.5	7.3	10.8	2.5	6.0	3.4	20.4

species of the *Other species group* as well as the entire group itself show the reverse.

All the foregoing comparisons when taken as a whole seem to justify the following conclusions. First, the indoor fly population in both areas is definitely dominated by *Musca vicina* which made up over 93 per cent of the mean population. This is due to the predilection which this fly manifests in entering the dark interior of houses while seeking for food and shelter. Second, the indoor population in the urban area is definitely more dense than in the rural area. This fact is correlated with the breeding habits of *Musca vicina*, the dominant indoor species, as will be shown in detail in the succeeding paper of this series. Third, the outdoor population is more dense in the urban area than in the rural area. This is due largely to the habit of *Chrysomya megacephala* of breeding in liquid human feces in latrines and at feces cake drying grounds in and around the city. Feces cakes are not dried in the rural area. Fourth, the species which make up the outdoor population in the urban and the rural areas show certain important differences. *Chrysomya megacephala* is the dominant species in both areas and it is definitely more abundant and constitutes a bigger percentage of the population in the urban area than in the rural one. *Musca vicina* is much more abundant and made up a bigger percentage of the popu-

lation in the outdoor stations of the urban area than it is in the rural one. The *Other species group* is equally dense in both areas though it made up a bigger percentage of the population in the rural than in the urban area as did the individual species among this group. Among this group, both *Muscina stabulans* and Genus *Sarcophaga* were more dense in the urban than in the rural area; the indices for *Lucilia sericata* in the two areas were approximately the same; while the *Miscellaneous group* was definitely more dense in the rural than in the urban area. Most of these important differences can be explained in the light of the breeding habits and abundance of the breeding media which are suited to the different species concerned. The data which will make this point clear will be presented in the next paper of this series.

SUMMARY

A total of 101,481 flies was trapped by standard trapping methods in 9 indoor and 9 outdoor stations in four villages of the Lungshan rural area of West Shantung, China, between May and September 1937. A study of the density indices and species make up the population taken from these trap-pings revealed the following:

1. *Musca vicina* was the dominant species in the indoor stations comprising from 81.5 per cent to 100 per cent with an average of 94.4 per cent of the population, and with a density index of from 6.7 to 44.3 with an average of 18.9 for the nine stations. *Chrysomya megacephala* and the *Other species group* made up the remaining portion of the indoor population.

2. *Chrysomya megacephala* was the dominant species of the outdoor stations, making up from 37.0 per cent to 58.5 per cent with an average of 47.9 per cent of the population and with a density index of from 48.7 to 374.1 with an average of 191.6. The *Other species group* is the next in importance comprising from 22.6 per cent to 61.6 per cent with an average of 44.8 per cent of the population and with a density index of 63.4 to 442.0 and an average of 177.5. *Musca vicina* made up only a small percentage of the outdoor population with a low density index in all stations but one (18), where exceptional amounts of pig manure were available for breeding.

3. The outdoor population index was from 10 to 100 with an average of 23 times as large as was the indoor index in the four villages studied.

4. The four villages all showed different general fly density indices for both outdoor and indoor stations but the ratios of the indices of the various species to each other were similar in all four villages.

5. The month by month variations of the average density indices for the species in the 9 indoor stations showed that *Musca vicina* appeared in July, increased to a maximum number in August and declined thereafter, while the other species were negligible during all months.

6. The monthly variations in the outdoor stations showed that *Chrysomya megacephala* appeared in late June and reached the highest point in August. The *Other species group* was already present when trapping started in May and rose to a maximum in July. *Musca vicina* appeared in June and was present in large number in August.

7. Comparisons between the fly population in the Lungshan rural area for 1937 with that of the Tsinan urban area for 1936 showed that:

(A) The indoor population in the urban area was definitely denser than in the rural area.

(B) *Musca vicina* was the dominant indoor species and constituted over 93 per cent of the population in both areas.

(C) The density of the outdoor population also was greater in the urban than in the rural area.

(D) *Chrysomya megacephala* was the dominant species in the outdoor population of both areas and was definitely more dense and made up a bigger percentage of the population in the urban than in the rural area.

(E) The *Other species group* was equally dense out of doors in both areas although it made up a bigger percentage of the outdoor population in the rural than in the urban area as did the individual species of this group. Among this group, both *Muscina stabulans* and Genus *Sarcophaga* were definitely more dense in the urban than in the rural area; the indices for *Lucilia sericata* in the two areas were approximately the same; while the index for the *Miscellaneous group* was definitely much higher in the rural than in the urban area.

(F) *Musca vicina* was more dense and made up a bigger percentage of the outdoor population in the urban than in the rural area.

(G) Most of these differences in population density and species make up in the two areas seem to be correlated with breeding habits and opportunities for breeding as will be shown in the succeeding paper of this series.

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ILLUSTRATIONS

- FIG. 1. Showing monthly variations in the mean fly density indices of all flies, *Musca vicina*, *Chrysomyia megacephala*, and the *Other species group* in outdoor stations. Ordinate: fly density; abscissa: months.
2. Showing monthly variations in the corrected percentages of all flies belonging to *Musca vicina*, *Chrysomyia megacephala*, and the *Other species group* in outdoor stations. Ordinate: percentage of flies; abscissa: months.
3. Showing monthly variations in the mean density indices of *Muscina stabulans*, genus *Sarcophaga*, *Lucilia sericata*, and *Miscellaneous species* of the *Other species group* in the outdoor stations. Ordinate: fly density; abscissa: months.
4. Showing monthly variations in the corrected percentages of all flies belonging to *Muscina stabulans*, genus *Sarcophaga*, *Lucilia sericata*, and the *Miscellaneous species* in the outdoor stations. Ordinate: percentage of flies; abscissa: months.

LIGATURES AND CONJUNCTIONS IN ILOKO

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CHAPTER I. THE LIGATURE

I. THE LIGATURE A OR ÑGA

I. In the grammars of Revs. Naves and Lopez are formulated the following rules for the discrimination between the use of *a* and that of *ñga*:

1. Naves: *A* is used when placed between a word ending in a consonant and one beginning with a consonant; *Ñga* is used when placed between a word ending in *a* and one beginning with *a*.

2. Lopez: *Ñga* is used when following a word in *a*; *A* is used in all other cases.

Our own opinion: Euphony is the only rule and daily use the only teacher; but to make the use of both ligatures uniform in literature, we follow the opinion of most all serious Iloko writers, who actually accept the following rules:

A is written whenever it is followed by a word beginning with a consonant;

Ñga is written whenever it is followed by a word beginning with a vowel. Examples:

<i>ti baláy a dakkél</i>	the large house.
<i>ti áso a bassít</i>	the small dog.
<i>ti púsa a bassít</i>	the small cat.
<i>ti narbá ñga agámanñg</i>	the ruined granary.
<i>ti púso ñga agladiñgit</i>	the heart that grieves.
<i>ti dakkél ñga áso</i>	the big dog.
<i>ti púsa ñga immáy</i>	the cat that came.
<i>ti áso ñga úmel</i>	the dumb dog.
<i>ti bassít ñga ubínñg</i>	the small child.

II. This ligature is used to connect almost all members of the sentence with one another, and also to connect subordinate clauses with the principal one.

A. It is always used to translate the English relative pronoun except in one case, where the ligature *ti* takes its place.

Sometimes the term which in English is introduced by a relative pronoun, precedes the noun it modifies, exactly like an or-

dinary adjective and with the same nuance of meaning. Cfr. The Adjective. IV. General Remarks. I¹.

Ti táo ñga immáy, "the man who came", or *ti immáy a táo*, "the man who came" (with less stress on the clause "who came").

This illustrates the nature of the Iloko ligature *a* or *ña*, which very often includes more or less the notion of a relative pronoun: *ti kabáyo a napigsá*, "the horse which is strong", and its inversion: *ti napigsá a kabáyo*, "the strong horse". Examples:

<i>ti lakay nga immay</i>	the old man who came.
<i>dagiti táo a mapán aglakláko</i>	the men who go to sell cloth.
<i>iti abél</i>	
<i>lakáykayo a dakkél únay ti</i>	you are old men who have much
<i>síribna</i>	wisdom.
<i>nakítami daydi ubiñg a naka-</i>	we saw the child who burnt our
<i>úram iti balaymi</i>	house.
<i>awán ti táo a saánna a kayát</i>	there is no man who does not like to
<i>ti uminúm no mabalínna</i>	drink if he can.
<i>dakami a nakapúkaw kada-</i>	we who lost all our belongings.
<i>giti ámin a kúkuami</i>	
<i>ayabám ni Pédro a napán</i>	call Peter who went to get wood the
<i>nañgála iti káyo idi namin-</i>	afternoon before last.
<i>sán a malém</i>	

NOTE 1.—When the subject of a subordinate clause introduced by a relative pronoun is the same as that of the principal sentence, it is always expressed in the third person singular, when it stands for a possessive. In case it stands for a personal pronoun, it is omitted. Cfr. The Pronoun. I. Personal Pronouns. 1. Note IV.² Examples:

<i>siká ñga addá nákemna</i>	you that have sense.
<i>siká ti Dióska ñga awán pa-</i>	Thou art my God Whose kindness is
<i>tiñggá ti imbágná</i>	infinite.
<i>siák ñga adú ti kúkuana</i>	I who have much property.
<i>siák a napán kimmíta</i>	I who went to see.
<i>dakami a nagsublí</i>	we who came back.
<i>dakayó a bassít ti pammátina</i>	you who have little faith.
<i>dakayó a mayát</i>	you who are willing.
<i>dakayó a narígat ti biágná</i>	you whose lives are hard.
<i>isúda a nasiñgpét ti panag-</i>	they who lead a virtuous life.
<i>biágná</i>	
<i>isúda a timmaráy</i>	they who ran away.
<i>dagiti áso a kimmagát</i>	the dogs that bit.
<i>dakami ti awán pirákna</i>	we are those who have no money.
<i>siká ti awán ásona</i>	you are the one who has no dog.
<i>siák ti napán nañgála iti gi-</i>	I was the one who went to get what
<i>natañgda</i>	they bought.
<i>dakami ti madi</i>	we are those who refuse.
<i>dakayó ti agtaráy</i>	you are those who run.
<i>isúda ti addá ásona</i>	they are those who have dogs.

¹ Anthropos 26 (1931) 485.

² Anthropos 28 (1933) 686.

B. In the course of preceding papers we have very often touched on the subject of the ligature, when we explained the use of the different members of the grammatical sentence; however, to be complete, we give the following tables, which may serve as a recapitulation and at the same time supply all omissions; a third table will find its place under the ligature *ti*.

FIRST TABLE

The ligature *a* or *ña* is used:

1. Between two substantives, when the last qualifies the first.

Examples:

<i>ti áso a babái</i>	the bitch.
<i>ti kaldíng a laláki</i>	the he-goat.
<i>ti baláy a káyo</i>	the wooden house.
<i>ti káwar a landók</i>	the iron chain.

2. Between substantives and attributes, or vice versa. Examples:

<i>ti áso a dakkél</i>	the large dog.
<i>ti ubíng a bassít</i>	the small child.
<i>ti naziñgpét a balásan̄g</i>	the virtuous girl.
<i>ti napigsá a nuán̄g</i>	the strong carabao.

3. Between numbers and substantives or attributes. Examples:

<i>duá a téo</i>	two men.
<i>talló a babái</i>	three women.
<i>uppát a dakkél</i>	four big ones.
<i>san̄gapúlo a napigsá a kabáyo</i>	ten strong horses.

4. Between personal pronouns of the first series and substantives, attributes or numbers. Examples:

<i>dakamí a babaknáñg</i>	we rich men.
<i>isúda a lalláki</i>	they, men.
<i>siká a babái</i>	you, a woman.
<i>siák a napan̄glaw</i>	I, a poor man.
<i>dakayó a duá</i>	you two.
<i>datayó ñga uppát</i>	we four.

5. Between the complete forms of the demonstratives and substantives without a qualifying word, attributes or numbers. Examples:

<i>daytáy a lakáy</i>	this old man.
<i>dagitáy a babaknáñg</i>	these rich men.
<i>dagitá a natáyag</i>	those tall ones.
<i>dagidiáy ñga uppát</i>	those four.

NOTE 2.—The ligature may be omitted in this case. Examples:

<i>daytáy lakáy</i>	this old man.
<i>dagitá babaknánġ</i>	those rich men.
<i>daydiáy natáyag</i>	that tall one.
<i>dagitáy duá</i>	those two.
<i>daydí ubiġ</i>	that child.

6. Between adjectives and adverbs, or vice versa. Examples:

<i>naġġina a nalabés</i>	too expensive.
<i>napalálo a dakkél</i>	too large.
<i>pásig a nalukmég</i>	all of them fat.
<i>pulós a dákes</i>	entirely bad.
<i>kastóy a dakkél</i>	as large as this.
<i>nabaknánġ a sígud</i>	rich from the beginning.

7. Between some numbers. Examples:

<i>uppát a púlo</i>	forty.
<i>siám a gasút</i>	nine hundred.
<i>inném a ribu</i>	six thousand.

8. Between predicates without a definite subject or indefinite substantives and substantival verbs. In this case, the substantival verb corresponds to an English infinitive. Examples:

<i>nakaay-ayát a buyáen</i>	it is lovable to look at it.
<i>nakaladladinġit a denġġén</i>	it is sad to hear it.
<i>nasam-it a ramanán</i>	it is sweet to the taste.
<i>narígat a baonén</i>	it is hard to send him.
<i>naimbág a tuġġpálen</i>	it is good to comply with it.
<i>nalaká a patién</i>	it is easy to believe it.
<i>dákes ġġa inumén</i>	it is bad to drink it.
<i>nakaskasdáaw a kitkitáen</i>	it is wonderful to behold.
<i>táo ġġa ayatén</i>	a man to be loved.
<i>lakáy a dayáwen</i>	an old man to be honored.
<i>annóng a tuġġpálen</i>	a duty to be complied with.
<i>rebbénġ a lualoén</i>	one should recite the prayer.

9. Between predicates with a definite subject and verbs. In this case, the verb corresponds to an English present participle. Examples:

<i>nasadútak a mamúnag</i>	I am lazy in carrying.
<i>nasiglát ġġa agtaráy</i>	he is a swift runner.
<i>napigsákami a manġamit</i>	we are strong bearers.
<i>nalainġka ġġa agsánġit</i>	you are good at weeping.
<i>narugitda ġġa aglúto</i>	they are dirty cooks.
<i>adúkami a manġán</i>	we are many eaters.
<i>bassít kayo a mapán</i>	you are few to go.
<i>nalakáda a humakáy</i>	they age easily.
<i>nadarásyo ġġa inála</i>	you got it quick.
<i>nalakáda a malipátan</i>	they forget it easily.
<i>narígatda a nabirókan</i>	they found it with difficulty.
<i>duáda ġġa immáy</i>	they came two of them.

10. Between substantival verbs and adjectival verbs with a definite subject. In this case, the adjectival verb corresponds to an English clause introduced by "that". Examples:

<i>kayátko a pumánawda</i>	I want them to go away.
<i>ammok a mayátda</i>	I know that they are willing.
<i>ammóna a nagtaráyak</i>	he knows that I ran.
<i>nadámagda a nagtálawkami</i>	they heard that we escaped.
<i>ipalúbosda nga umáykayo</i>	they allow you to come.
<i>dida tinañgdánan a nagban-</i>	they gave him no salary when he
<i>bannóg</i>	worked till he was tired.
<i>inpakaammóda a natáy ti</i>	they announced the death of my hus-
<i>asáwak</i>	band.

11. Between two substantival verbs. In this case, the second verb corresponds to an English infinitive, or, if the subject of both verbs is not the same, to an English clause introduced by "that". Examples:

<i>kayátmi nga aláen</i>	we want to take it.
<i>ammóna a basáen</i>	he knows how to read it.
<i>inkarína a sinapataán</i>	he promised under oath.
<i>kayátda a kanén</i>	they want to eat it.
<i>tinulbekánna a niluktán</i>	he opened it with the key.
<i>ibílinmi a birókenyo</i>	we order you to look for it.
<i>ipalúbosda a sagádanmi</i>	they allow us to sweep it (that we
	sweep it).
<i>kayátko a balkótenda</i>	I want them to wrap it up.
<i>kinonána nga inapúnngol ti</i>	he said embracing his brother.
<i>kabsátna</i>	

12. Between adjectival verbs and substantival verbs. In this case, the substantival verb corresponds to an English present participle, or, if the subject of both verbs is not the same, to an English clause introduced by "that". Examples:

<i>di sumunǵbát nga ayabán</i>	he does not answer when called.
<i>di agtaliáw a pakisaoán</i>	he does not look back when spoken
	to.
<i>maitibkúlda a ginagára</i>	they stumble on purpose.
<i>kumugtár a sakayán</i>	he kicks when mounted.
<i>agsánǵit a baúten</i>	he weeps when whipped.
<i>madí a baonén</i>	he refuses to be sent.
<i>mayátda nga aláenmi</i>	they are willing that we take it.
<i>madída a sagádanmi</i>	they do not want us to sweep it.
<i>di nagtímek a bináutda</i>	he said nothing when they whipped
	him.

13. Between two adjectival verbs. In this case, the second verb corresponds to an English present participle, or, if the

subject of both verbs is not the same, to an English clause introduced by "that". Examples:

<i>aggagétka ñga agádal</i>	be diligent in studying.
<i>agináyadda a magná</i>	they walk slowly.
<i>agin-ínutda a pumídut</i>	they steal a little at a time.
<i>agpukpukkáwda a matmatú- rog</i>	they shout sleeping.
<i>agsursúrat a manñmanñán</i>	he writes eating.
<i>agbasbásaka a magmagná</i>	you read walking.
<i>madi a kumíta</i>	he refuses to look.
<i>mayátda ñga umáy</i>	they are willing to come.
<i>mayátda ñga umáykami</i>	they are willing that we come.
<i>madáda a magnákami</i>	they do not want us to walk.

14. Between *addá* with a definite subject and adjectival verbs. In this case, the verb corresponds to an English present participle. Examples:

<i>addáak ñga umáy</i>	I am coming.
<i>addáda ñga agsursúrat</i>	they are writing.
<i>addá a matúrog</i>	he is sleeping.
<i>addákayo a mapán</i>	are you going?

15. Between verbs and adverbs, or vice versa. Examples:

<i>siğud a mayát</i>	he has always been willing.
<i>kankandáyon a madi</i>	he always refuses.
<i>madi a pulós</i>	he doesn't want at all.
<i>sagpaminsán ñga umáy</i>	he comes now and then.
<i>inaldáv ñga agsánñgit</i>	he weeps every day.
<i>matúrogda a patináyon</i>	they always sleep.

16. Between the negative *saán* the the word it qualifies. Examples:

<i>saán a dákes</i>	it is not bad.
<i>saán a táo</i>	he is not a man.
<i>saánda a talló</i>	they are not three.
<i>saán ñga umáy</i>	he does not come.
<i>saán a siák</i>	not I.
<i>saán a ni daytáy</i>	not this one.
<i>saánna ñga inála</i>	he did not take it.
<i>saánko a kayát</i>	I don't like it.
<i>saán a tapnó umáyka</i>	not that you should come.

17. After a few conjunctions. Examples:

<i>apáman a pimmánaw</i>	he was scarcely gone.
<i>isúna láeng ñga addá ditòy</i>	the question is that it is here.
<i>idínto a simmayáaten</i>	while it had grown nicer already.

SECOND TABLE

The ligature *a* or *nga* is omitted in the following cases, where the numbers in parentheses correspond to those of the preceding table:

1 (1). Between *apó* without a possessive and the noun it modifies. Examples:

<i>ni apó lakáy</i>	the old gentleman.
<i>ni apó bakét</i>	the old lady.
<i>ni apó António</i>	Mr. Anthony.
<i>ni apó tesoréro</i>	Mr. treasurer.

2 (1). Between a few common names of persons used without a possessive and their proper names. Examples:

<i>ni amá Juán</i>	father John.
<i>ni lakáy António</i>	the old Anthony.
<i>ni bakét Ana</i>	the old Ann.

3 (2). Between *tuñggál* or *tumuñggál* and the word it modifies. Examples:

<i>tuñggál aldáw</i>	every day.
<i>tumuñggál dáras</i>	each time.
<i>sagtuñggál gasút</i>	each one hundred.
<i>tuñggál kadakayó</i>	everyone of you.
<i>tumuñggál aramídenda</i>	every time they do it.
<i>tumuñggál agsárakkami</i>	every time we meet.
<i>tuñggál kalpasán ti dáwat</i>	after each asking.
<i>tumuñggál baliksénná dagitòy</i>	every time he pronounces these
<i>a saò</i>	words.
<i>tuñggál dáwat</i>	every asking.
<i>tuñggál malagíp kayo</i>	every time I remember you.

4 (3). Between numbers ending in a vowel and some substantives. Examples:

<i>limá salapí</i>	two pesos fifty.
<i>dua salúp</i>	two gantas.
<i>talló bukél nga itlóg</i>	three eggs.
<i>sanḡapúlo ket duá kuríbut</i>	twelve baskets.

5 (5). Between the abbreviated forms of the demonstratives and substantives, attributes and numbers. Examples:

<i>di lakáy</i>	that old man.
<i>toy áso</i>	this dog.
<i>toy dakkél</i>	this large one.
<i>diáy bassít</i>	that small one.
<i>tay uppát</i>	those four.
<i>ta limá</i>	those five.

NOTE 3.—In a few cases the ligature may be used. Examples:

<i>toy a baláy</i>	this house.
<i>diáy a dakkél</i>	that large one.

6 (5). Between the complete forms of the demonstratives and substantives connected with attributes or numbers. Examples:

<i>daytáy dakkél nga áso</i>	this large dog.
<i>daydiáy lakáy a bulsék</i>	that blind old man.
<i>daydi bassít nga ubínġ</i>	that small child.
<i>dagitáy duá a babái</i>	these two women.
<i>dagidiáy natañgsít a baró</i>	those proud young men.
<i>dagidi talló a lalláki</i>	those three men.
<i>dagitáy ubbínġ nga úmel</i>	those dumb children.

7 (6). Between adjectives and adverbs, or vice versa. Examples:

<i>dakkél únay</i>	very large.
<i>bassít láenġ</i>	only little.
<i>inġgét sam-ít</i>	very sweet.
<i>adú pay</i>	many more.
<i>dáan met</i>	it's old though.

8 (7). Between some numbers. Examples:

<i>talló púlo</i>	thirty.
<i>waló púlo</i>	eighty.
<i>duá gasút</i>	two hundred.
<i>limá ribu</i>	five thousand

9 (13). Between the auxiliaries *in*, *mapán* and *umáy*, and the principal verb. In this case the verb corresponds to an English infinitive. Examples:

<i>inna biróken</i>	he goes to look for it.
<i>ínkam sapliten</i>	we go to whip him.
<i>napán nanġála</i>	he went to take some.
<i>napányo ginátanġ</i>	did you go to buy it?
<i>umáyda manġán</i>	they come to eat.
<i>immáy kimmíta</i>	he came to see.

10 (14). Between *addá* without a definite subject and adjectival verbs. Examples:

<i>addá umáy</i>	somebody comes.
<i>addá madi</i>	some refuse.
<i>addá manġála</i>	someone takes it.
<i>addá mayát</i>	some are willing.

11 (15). Between verbs and adverbs, or vice versa. Examples:

<i>madi láenġ</i>	he still refuses.
<i>kayátna únay</i>	he wants it badly.

<i>pagamoán sumanǵpét</i>	he arrives at once.
<i>mapán itá</i>	he goes now.
<i>agnaéd ditóy</i>	he lives here.
<i>umáyka darás</i>	come quickly.
<i>ínka biit</i>	go for a while.

12 (16). Between the negative *di* and the word it modifies.
Examples:

<i>díak kayát</i>	I won't.
<i>dída aláen</i>	they do not take it.
<i>dikam masápul</i>	we don't need it.
<i>dika agtákaw</i>	don't steal.

13 (17). In general, when an article, a conjunction, another ligature, and so on, connects the words. Examples:

<i>addá ti táo</i>	that man is there.
<i>dakkél ti áso</i>	the dog is big.
<i>napán itáy malém</i>	he went this afternoon.
<i>umáy no bigát</i>	he comes to-morrow.
<i>siák ti madi</i>	it is I who refuse.
<i>ibagám ta umáy</i>	tell him to come.
<i>inpánna idiáy baláy</i>	he carried it into the house.

II. THE LIGATURE *TI*

A. The ligature *ti* translates the English relative pronoun whenever the subject of a predicate or of an adjectival verb, the object of a substantival verb, an adverb, and so on, is emphasized and precedes all other members of the sentence. Cfr. The Pronoun. IV. Relative Pronouns. II³. Examples:

<i>siák ti natáyag</i>	I am the tall one.
<i>siák ti pagsurátanda</i>	I am the one to whom they write.
<i>ti anákmo ti nalukmég</i>	it is your child who is fat.
<i>idiáy baláy ti pagsanǵitanna</i>	he weeps in the house.
<i>dagiti tálonmo ti naláwa</i>	your rice fields are the large ones.
<i>ti panagsanǵityo ti napigsá</i>	your weeping is what is strong.
<i>ti áso ti awán</i>	it is the dog which is not there.
<i>baláy ti awán kaniák</i>	houses are what I have not.
<i>isúda ti addá</i>	they are those who are there.
<i>ti agináyad ti kayátda</i>	they want to do it slowly.
<i>isú ti madi</i>	he it is who refuses.
<i>ni Juan ti agsanǵit</i>	it is John who weeps.
<i>dakayó ti napúdot ti ólona</i>	you are those who are angry.
<i>dakami ti mapán</i>	it is we who go.
<i>asin ti gatánǵenmi</i>	salt it what we buy.
<i>ti lakáy ti sapúlenna</i>	the old man is the one he looks for.
<i>isúda ti kayátko</i>	them I like.

³ *Anthropos* 28 (1933) 701.

B. *Ti* is used as a ligature in the following cases:

THIRD TABLE

The numbers in parentheses correspond to those of the first table, under the ligature *a* or *ñga*.

1 (2). Between *ámin* meaning "the whole" and the word it modifies. Examples:

<i>ámin ti láboñg</i>	the whole world.
<i>ámin ti ili</i>	the whole town.
<i>ámin ti baláymi</i>	our whole house.
<i>ámin ti bagina</i>	his entire body.

2 (9). Between predicates without a definite subject and adjectival verbs. In this case, the verb corresponds to an English infinitive. Examples:

<i>narígat ti agkáli</i>	it is difficult to dig.
<i>nakaay-ayát ti makakíta ka-dakayó</i>	it is lovable to see you.
<i>nalaká ti agsaó</i>	it is easy to talk.
<i>naimbág ti agluálo</i>	it is good to pray.
<i>dákes ti agbásol</i>	it is bad to sin.
<i>naímas ti manígán no mabisín datáo</i>	it is sweet to eat when one is hungry.
<i>nakaladladíngit ti agsína ití gayyém</i>	it is sad to separate from a friend.
<i>nakaragragsák ti sumanígpet idiáy baláy</i>	it is joyful to come home.

3 (10). Between substantival verbs and adjectival verbs without a definite subject. In this case, the adjectival verb corresponds to an English infinitive. Examples:

<i>kayátko ti mapán</i>	I want to go.
<i>kayátda ti agtugáw</i>	they want to sit.
<i>ammóna ti agbása</i>	he knows how to read.
<i>ipalúbosmi ti agkatáva</i>	we allow laughing.
<i>inkariyo ti agbáyad</i>	you promised to pay.
<i>darasényo ti mapán</i>	go quickly.
<i>inayádenyo ti agálad</i>	make the fence slowly.
<i>sansánenda ti agluálo</i>	they pray often.

4 (14). Between *awán* and its indefinite subject, except when the ligature *ti* precedes it, in which case the second one is generally omitted, as well as in a few other cases which have to be learned by use. Examples:

<i>awán ti táo</i>	no man is here.
<i>awán ti umáy</i>	nobody comes.
<i>awán ti áso kadakuáda</i>	they have no dog.
<i>awán ti aláenda</i>	they take nothing.

<i>awán ti baláymi</i>	we have no house.
<i>awán ti insañpétida</i>	they brought nothing.
<i>awán ti birókenyo</i>	don't you look for anything?
<i>siák ti awán bagásna</i>	I am the one who has no rice.
<i>awán sabáli</i>	nothing else.

NOTE 4.—Sometimes the ligature *ti* becomes *t* when it follows a word ending in a vowel. Examples:

<i>isút mayát</i>	he it is who likes it.
<i>dakamít mapán</i>	we shall go.
<i>isúdat madí</i>	they are those who refuse.

5. The ligature *iti* sometimes replaces the ligature *a* or *ñga* between substantival verbs in literature; this form, which is probably incorrect, never occurs in speech and rarely in literature. Examples:

<i>dawátek iti isalákannak</i>	I ask you to save me.
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III. THE LIGATURE TA

1. This ligature takes the place of *a* or *ñga* after the substantival verb *ibagá*. Examples:

<i>ibagám ta umáy</i>	tell him to come.
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2. The ligature *ta* is sometimes used after conjunctions. Examples:

<i>idínto ta saónmo a makíta</i>	while you don't see him.
<i>anansá ta ibagák kadakayó</i>	therefore I tell you.
<i>agsípud ta immáy</i>	because he came.
<i>di la ket mamin-anó ta ag-sángit</i>	lest he weep.
<i>sápay komá ta mayát</i>	I wish he were willing.
<i>idí ta limmábas idiáy</i>	when he passed there.

IV. THE LIGATURE N

The ligature *n* is used:

1. To connect the adverbs *to* and *sa* to words ending in a vowel. Examples:

<i>addánto</i>	there will be some.
<i>walónto</i>	there will be eight.
<i>tínto mayát</i>	the one who shall be willing.
<i>aramidendanto</i>	they will do it.
<i>sánto umáy</i>	then he comes.
<i>inálanansa</i>	he probably took it.
<i>madínsa</i>	I think he refuses.
<i>isúdantonsa ti madí</i>	probably they will be those who refuse.
<i>isúnsa ti nagsángit</i>	he is probably the one who wept.

2. Sometimes to connect the stem to the reduplication of the first two syllables, when the last one ends in a vowel; if the last syllable of the reduplication ends in a consonant, the ligature *n* sometimes takes the place of that consonant. Examples:

<i>agkitankitada</i>	they look at one another.
<i>aglinniwanliwata</i>	let us console one another.
<i>agkarinkarikayo</i>	you promise one another.
<i>agayanayátda</i>	they love one another.
<i>nagsuransúratkami</i>	we wrote to one another.
<i>nakidubandúbarda</i>	they tried to overcome one another.

V. THE LIGATURE KA

1. The ligature *ka* may be used between cardinal numbers from two up and some substantives. Examples:

<i>talló katáo</i>	three men.
<i>sañgagasút a kasúkat</i>	one hundred measures.
<i>waló kakíta</i>	eight kinds.

2. The ligature *ka* is very often combined with the prefix *sañga* into *sañgka*, to form a prefix for units or unity. Examples:

<i>sañgkátgup</i>	one draught of water.
<i>sañgkapetpét</i>	one handful.
<i>sañgkagiddán</i>	in one; together.
<i>sañgkarañgkáy</i>	one piece (of meat).

VI. THE LIGATURE T

1. The ligature *t* is not much used in speech, but it occurs frequently in literature, where it is often joined to a word ending in a vowel. It is almost impossible to give any definite rules for the use of this ligature, as sometimes it is used and sometimes not in the same combination; consequently its use is more or less arbitrary. However, it is mostly met before adverbs or prepositions of time and place, in a few cases even replacing them. It should be noted here that some Iloko authors consider its use in some of the following examples (taken from Iloko books) entirely incorrect. Examples:

<i>gapót ití dakkél ñga ayátna</i>	because of his great love.
<i>nagtaklindat ití panañgibá- baet ti lakáy</i>	they relied on the mediation of the old man.
<i>dakdakkél lat bassít ñgem daytáy</i>	it is only a little larger than this one.
<i>pakipaglak-ámanmit ití imbág napándat sadi abagátan</i>	where we partake of the same good. they went south.
<i>immúlit sadi láñgit</i>	he ascended into heaven.
<i>awándat ditáy</i>	they are not here.
<i>kaykayátmot idí</i>	formerly you preferred it.

agsublikat sadí Manila
kúkuat ditoy líbonḡ
a kas lat itáy
addát ditá
intanémdat ditá
innaktot Manila
mapámkamit Bintár

go back to Manila.
 earthly goods.
 just like a while ago.
 he is there.
 they interred him there.
 I shall go to Manila.
 we go to Bintar.

NOTE 6.—The ligature *t* must not be confounded with the abbreviation of *ti* or *ití*. Examples:

aniát gapóna
aniántot mabalínna
nagpaidúmat sinḡpét

why?
 what shall he be able to do?
 full of virtues; extraordinarily vir-
 tuous.
 howsoever he keep silent.

nópay kasanót ulímekna

2. The ligature *t* is nearly always used between a word ending in a vowel and:

a. The adverbs of place *ta*, *toy* and *diáy*. Examples:

ínkat ta
aldát ta
nagsakitak idít ta
umáykat toy
awándantot toy
napándat diáy
agsublikamit diáy

go there.
 he is there.
 I was ill there before.
 come here.
 they will not be here.
 they went there.
 we go back there.

b. The abbreviated forms of the demonstratives in the nominative. Examples:

inálanat toy ásomí
saán a makakutí toy ímak
inaládannat ta baláyyo
aláennat diáy púsami
kasanót tay inám
binásadat tay súratko
aniát di kinayátna

he took our dog here.
 this hand of mine cannot move.
 he fenced that house of yours.
 he takes that cat of ours.
 how is that mother of yours?
 they read that letter of mine.
 what did he want?

c. The abbreviated forms of the demonstratives in the oblique, when their initial *i* is dropped. Examples:

saludsúndendat toy ubíḡmí
inbátinat ta baláyyo
inbagámit ta amán
makakítakamit diáy íliyo
nagsublít tay napanáwanna a
baláy
umáykayot di nagnyanánmi

they ask this boy of ours about it.
 he left it in that house of yours.
 we told it to that father of yours.
 we can see that town of yours.
 he went back to that house he had
 left.
 you will come to where we stayed.

d. The adverbs of time *itá*, *itáy* and *idí*, when their initial *i* is dropped. Examples:

<i>umáydat ta</i>	they come now.
<i>ipakaammómit ta</i>	we announced it now.
<i>itattá (for: itaitá)</i>	presently.
<i>nagsublikamit tay</i>	we returned just now.
<i>itattáy (for: itaitáy)</i>	just a while ago.
<i>madídat tay</i>	they refused just now.
<i>inbagáyot di</i>	you said so at the time.
<i>inálanat di</i>	he took it then.

3. The ligature *t* is used ordinarily after the prepositions or conjunctions *inǵgá*, *inǵgána*, *aginǵga*, *aginǵgána*. Examples:

<i>inǵgat malém</i>	until afternoon.
<i>inǵgát dína maasáas</i>	until he has learned it thoroughly.
<i>inǵgánat tunǵpál biágko</i>	till the end of my life.
<i>inǵgánat iti díka natáy</i>	until you die.
<i>inǵgánat ti saán a nalúto</i>	until it is cooked.
<i>inǵgánat mabalinko</i>	with all my might.
<i>inǵgánat aggibus toy biág</i>	until the end of this life.
<i>inǵgánat kabaelán</i>	with all one's might.
<i>inǵgánat iti mabayádan ámin</i>	till everything has been paid.
<i>aginǵgát masanǵoánan</i>	until the future.
<i>aginǵgát mabayádan ámin</i>	till you have paid everything.
<i>aginǵgánat itá</i>	till now.

Chapter II: THE CONJUNCTION

I. THE CONJUNCTION "AND"

1. The conjunction "and" is represented in Iloko by *ken* and *ket*.

1. *Ken* is used to connect two words or sentences which form a whole through their connection with another term either preceding or following, and which consequently cannot be separated without affecting their meaning.

2. *Ket* is used to connect two words or sentences which are entirely independent from any other term, so that either of them can be used separately without affecting their meaning.

A. *ti naluknéñǵ ken naímas a tinápay*, "the soft and sweet bread". The two qualifications form a whole through their connection with the substantive; if they were used without any connecting conjunction, they would refer to two different objects: *ti naluknéñǵ*, "the soft one"; *ti naímas a tinápay*, "the sweet bread"; therefore they are connected by *ken*.

B. *ni Ana babái ket ubiñǵ*, "Ann, a girl and a child". The two predicates are entirely independent and could easily be used separately; *ni Ana babái* would mean "Ann, a girl"; *ubiñǵ*, "she is a child"; therefore they are connected by *ket*.

C. *siká ñga apók, manǵiturónǵ, manǵikanáwa ken masirib a mamatigmáan kaniák, ket naimbág únay a gayyémko*, "you, my

master, the one who guides, guards and wisely advises me, and my very good friend. Here are three independent predicates: a. *apók*; b. *mañgituroṅg*, *mañgikanáwa ken masirib a mamatigmáan kaniák*; c. *naimbág únay a gayyémko*; each of them could be used separately: a. my master; b. the one who guides, guards and wisely advises me; c. my very good friend; therefore they are connected by *ket*. The second qualificative is a triple one and each part depends on the term *kaniák* (me); therefore they are connected by *ken*; if each part stood alone, they would not have the same meaning: *ti mañgituróng*, "the one who guides somebody"; *ti mañgikanáwa*, "the one who guards somebody"; *ti masirib a mamatigmáan kaniák*, "the one who wisely advises me".

D. *agmalmalém ken agpatnágka*, "you stay the whole day and night". If separated, these terms would mean: he stays the whole day, you stay the whole night; therefore *ken* is used.

E. *ayatén ken taraknénda idá*, "they love and feed them". If separated, these two terms would mean: to love (them), they feed them; therefore *ken* is used.

F. *agtaéñg ditoy ket kankanáyon a tuloṅgannakami*, "he resides here and always help us". These two sentences could easily be used separately: he resides here, he always helps us; therefore *ket* is used.

G. *aniá ti addá idiáy?—áso ken púsa*, "what is there?—a dog and a cat". Both substantives *áso* and *púsa* depend on the term *addá* (expressed or understood). If they were separated or connected with one another by *ket*, the sentence would mean: there is a dog (and) it is a cat; therefore *ken* is used. Examples:

<i>ti lúpot a napigis ken naru-gitán</i>	the torn and dirtied cloth.
<i>tapnó nalaglagdáda pay ken nanaynáyonda</i>	so that they be still stronger and of longer duration.
<i>dagiti kakabagián ken amammóna</i>	his relatives and acquaintances.
<i>ti pagimbagán ti kararuá ken bagi</i>	the good of soul and body.
<i>isúna la a dawátek ken kayát-ko ti túlongmo</i>	but I beg and desire your help.
<i>saoénna a nailét ti roáñgan ken no kasanó ti panagbiágta</i>	he says that the door is narrow and how we have to live.
<i>sibubutéñg ken mamayegpégak</i>	I am full of fear and I tremble.
<i>addáda a siliidáy ken agsangsángit</i>	they are sad and weeping.

nagtagikampílan ken nagtagi-
pañg-órkayo ñga immáy
ti nañgñég ken nakitayo
ti amána a bulséek ken masak-
sakít

isú ti asín ken sílaw ti lúboñg
nagsagába kadagiti nakáro a
túok ken rañggás

táo ñga agdindinámag iti
kinapakumbabá ken kina-
manákem

tapnó madaydayawka iti isú
amin a yan ken iti isú amin
a táo

sañgapúlo ket duá
talló gasút ket uppát a púlo
kayát ti lakáy ket mayátak
met

ikkánnak ti pirák ket aramí-
dem ñga awán ti kúrañgko
siká ti pagtaklínanmi ket da-
wátenmi ti túlongmo

isalákkannakami ket irámanmo
dagiti kakabsátmi

agpatnágka ditóy ket uráyen-
nak

kablaáwanka ket kayátko a
kablaáwan dagiti gayyé-
mo

makisaóka kenkuána ket pa-
nunótem ti ayátna kenká

díka maituréed ket awán ti bí-
legmo

tulóngam idá ket kaasiánna-
kami

ti nákemko maáwis ket matig-
náy

badáñgannak ket iturónñnak
iti nalintég a dалан

manípud iti duá a tawén ket
appababá

tinúloyna ti nagná ket kino-
nána iti nákemna

ket ti agáni umáwat iti báyard
ket agornónñg iti búnga

maysá ti agmúla ket sabáli
ti agáni

isúrom kenkuána ti pudnó ket
yadayóm kenkuána dagiti
isú amin a sipñgét ti kina-
neñgnéng

you came carrying swords and clubs.

what you heard and saw.
his blind and sick father.

he is the salt and light of the world.
he suffered intense tortures and in-
juries.

a man renowned for humility and
sense.

so that you be honored in all places
and by all men.

twelve.

three hundred forty.

the old man is willing and I also.

give me money and make that I want
nothing.

we rely on you and we ask your help.

save us and do the same to our
brothers.

stay here all night and wait for me.

I salute you and I want to salute
your friends.

talk with him and think about his
love for you.

you cannot stand it and you have no
strength.

help them and have pity on us.

my will is attracted and touched.

help me and lead me on the right
way.

from two years down.

he continued walking and thought by
himself.

and the reapers receive the price and
gather the fruits.

one man sows and another one reaps.

teach him the truth and drive away
from him all darkness and igno-
rance.

NOTE 7.—If there are more than two words or sentences to be connected with one another, the conjunction is ordinarily used only between the last two. Examples:

<i>ti áso a nanġisit, dakkél ken nakottónġ</i>	the black, large and thin dog.
<i>tuládek ti pananġumsina ití bagína met láeng ken ití lúbonġ, ti pananġparparí-gatna kadagití gartém, ti kinapakúrañġ ken ti kinalalus ti nákem</i>	I imitate his contempt of self and of the world, his mortification of the passions, the humility and the purity of the mind.
<i>ti áso a nanġisit dakkél, nakottónġ ket atiddág ti ipus-na</i>	the black dog is large, thin and has a long tail.
<i>ni Juán manákem a táo, masírib ket nasiñgpét</i>	John is a sensible man, wise and virtuous.
<i>kadagití saóna a kásda la natarumámis a pána salpótenna dagiti púso dagiti tattáo ket maáwisna nga agkabláaw kenkuána ti umatiwekwék a tattáo, ket iturayanna dagiti ar-ári, pakigtóttenna dagiti babaknánġ, parmekénna dagiti gagayyémna ket pasuróten-na ití nákemna dagiti isú ámin nga il-ili</i>	by his words, like sharp arrows, he pierces the hearts of men and makes great numbers of people salute him, and rules over kings, startles the rich, vanquishes his enemies, consoles his friends and makes all peoples obey his will.

8. To connect two substantives in the plural, *káda* is sometimes used instead of *ken*, with the meaning of indefiniteness. Examples:

<i>balbaláy káda taltálon</i>	houses and rice fields.
<i>dagiti lallakáy káda babbakét</i>	old men and women.
<i>rineppétda ití talí káda káwar</i>	they bound him with ropes and chains.
<i>babbalásanġ káda babbaró</i>	girls and young men.

II. When a series of terms is introduced by a personal pronoun in the singular, a proper name or a common name (allowing the article *ni*) in the singular:

A. The ordinary conjunction *ken* may be used to connect the last two terms of the sentence. Examples:

<i>ni Luís ken ni Ana</i>	Lewis and Ann.
<i>siák ken ni Luís</i>	I and Lewis.
<i>ni áma ken ni Luís</i>	my father and Lewis.
<i>ni inám ken dagiti kakabsátmo</i>	your mother and your brothers.
<i>dayáwem ni amám ken ni inám</i>	honor thy father and mother.
<i>siák, ni Luís ken ni Ana</i>	I, Lewis and Ann.

ni Luís, ni Ana ken ni Pédro Lewis, Ann and Peter.
ni kabsátko, ni gayyémko ken my brother, my friend and my uncle.
ni ulitégko

B. The more elegant and perhaps the more correct way is:

1. To use the form of the nominative plural for the first term, the form of the oblique plural for the intermediary ones, and the form of the oblique singular for the last term, except:

a. When the terms are in the plural, in which case the form *kadagiti* has to be used at least with the term which follows immediately a term with *da* or *káda*;

b. When the terms do not allow the article *ni*, in which case the form *iti* has to be used at least with the term which follows immediately a term with *da* or *káda*. Examples:

GENERAL RULE

<i>da Luís ken María</i>	Lewis and Mary.
<i>dakamí ken Luís</i>	I and Lewis.
<i>isúda ken María</i>	she and Mary.
<i>dakayó ken Juán</i>	you and John.
<i>da áma ken kabsátko</i>	my father and my brother.
<i>da Luís káda Ana káda Pédro</i> <i>ken María</i>	Lewis, Ann, Peter and Mary.
<i>dakamí káda Luís ken Ana</i>	I, Lewis and Ann.
<i>da gayyémko káda Luís ken</i> <i>Ana</i>	my friend, Lewis and Ann.
<i>daytá ti púsa da Luís ken Ana</i>	that is the cat of Lewis and Ann.
<i>ti baláygo ken Ana</i>	the house of you and Ann.
<i>daytáy ti ásoda ken gayyémna</i>	this is the dog of him and his friend.

EXCEPTIONS (a)

<i>da Luís kadagiti allawági ken</i> <i>gayyémna</i>	Lewis and the carpenters and his friends.
<i>da Luís kadagiti kakabsátna</i>	Lewis and his brothers.
<i>dakamí kadagiti allawági</i>	I and the carpenters.
<i>da ulitégko kadagiti allawági</i>	my uncle and the carpenters.
<i>da áma kadagiti gayyémko</i> <i>ken am-ammók</i>	my father, my friends and acquaintances.
<i>da áma kadagiti allawági ken</i> <i>gayyémna</i>	my father, the carpenters and his friends.
<i>da Pédro káda áma kadagiti</i> <i>kakabsátko</i>	Peter, my father and my brothers.
<i>da Luís káda Pédro kadagiti</i> <i>kakabsátmi ken am-ammómi</i>	Lewis, Peter, our brothers and acquaintances.

EXCEPTIONS (b)

<i>da Luís iti allawági</i>	Lewis and the carpenter.
<i>dakayó iti allawági</i>	you and the carpenter.
<i>isúda iti allawági</i>	he and the carpenter.
<i>da Luís iti allawági ken ti am-</i> <i>ammóna</i>	Lewis, the carpenter and his acquaintance.

<i>dakayó káda gayyémko iti allawági</i>	you, my friend and the carpenter.
<i>da Luis káda Maria iti allawági</i>	Lewis, Mary and the carpenter.
<i>da Pédro káda Ana iti allawági ken ti kosinéro</i>	Peter, Ann, the carpenter and the cook.

2. That is the rule for the nominative and the genitive; but, if the series is in the oblique, all forms must be in the oblique. Examples:

<i>yáwatmo káda Luis ken Maria</i>	give it to Lewis and Mary.
<i>yáwatmo káda Luis káda Ana káda Pédro ken Maria</i>	give it to Lewis, to Ann, to Peter and to Mary.
<i>yáwatko kadakayó ken Maria</i>	I give it to you and Mary.
<i>ipánmo káda áma ken Maria</i>	carry it to my father and to Mary.
<i>inálak káda ulitégko káda Maria ken asáwana</i>	I took it from my uncle, from Mary and from her husband.
<i>yáwatmo káda Luis kadagiti kakabsátna</i>	give it to Lewis and to his brothers.
<i>yáwatmo káda Luis kadagiti allawági ken gayyémna</i>	give it to Lewis, to the carpenters and to his friends.
<i>inálak káda ulitégko kadagiti kakabsátko ken am-ammók</i>	I took it from my uncle, from my brothers and from my acquaintances.
<i>yáwatmo káda Luis iti allawági</i>	give it to Lewis and to the carpenter.
<i>yáwatmo káda Luis iti allawági ken iti am-ammóna</i>	give it to Lewis, to the carpenter and to his acquaintance.
<i>ginátanġko káda Ana iti allawági ken iti am-ammóna</i>	I bought it from Ann, from the carpenter and from his acquaintance.

NOTE 9.—The same forms may be used when a demonstrative pronoun in the singular (in English) or a common name in the plural introduces the sentence, provided that proper names or common names with *ni* are included in the series. Examples:

<i>dagitáy ken Ana</i>	this one and Ann.
<i>dagidiáy káda Ana ken Luis</i>	that one and Ann and Lewis.
<i>dagitáy káda áma ken Luis</i>	that one and my father and Lewis.
<i>dagitá káda gayyémko ken Ana</i>	that one and my friend and Ann.
<i>dagitáy ken Pédro</i>	this one and Peter.
<i>dagitá ken Ana</i>	that one and Ann.
<i>dagiti kakabsátko ken Luis</i>	my brothers and Lewis.
<i>dagiti allawági káda António ken Ana</i>	the carpenters, Anthony and Ann.
<i>dagiti kaaróbami káda gayyémni ken Luis</i>	our neighbors, our friends and Lewis.

10. When a personal pronoun enters the series, it should be placed first. Examples:

<i>dakamí ken Juan</i>	I and John.
<i>dakamí káda Luis kadagiti gayyémko</i>	I, Lewis and my friends.

dakayó kadagitóy
isúda ití allawági

you and these ones.
he and the carpenter.

11. If the first term is a personal pronoun or a demonstrative in the plural, the ordinary conjunction *ken* connects at least the last two terms of the series. Examples:

dakamí ken ní Juán
dakayó ken ní António
dakayó, ní Ana ken ní Luís
dagitóy ken ní áma
dagidiáy ken ní kabsátko
dagitáy, ní Ana ken ní kabsát-
ko

we and John.
you and Anthony.
you, Ann and Lewis.
these ones and my father.
those ones and my brother.
those ones, Ann and my brother.

II. THE CONJUNCTION "OR"

I. The conjunction "or" is represented in Iloko by *ken* and *wennó* or *annó*.

1. *Ken* is used occasionally to connect two words or sentences which are entirely independent from any other term, so that either of them can be used separately without affecting their meaning.

The difference between the disjunctive and the copulative *ken* may best be illustrated by the following examples:

addá áso ken púsa, "there is a dog and a cat"; both terms depend on *addá* (*ken* copulative);

áso ken púsa aláem, "dog or cat, take it"; both terms are independent predicates: *áso*, *púsa*, *aláem*, "it is a dog, it is a cat, take it"; therefore *ken* is disjunctive. If the conjunction were a copulative, *ket* should be used, and the sentence would have an impossible meaning: *áso ket púsa*, "it is a dog and it is a cat".

agsañgít ken agkatáwa makaammó, "he weeps or he laughs, it is his business". If the conjunction were a copulative, *ket* should be used, because the predicates are independent from any other term: *agsañgít ket agkatáwa*, "he weeps and laughs". Examples:

kayát man ken saán dagití ub-
bínġ

whether the children like it or not.

umáy man ken saán

whether he comes or not.

addá pirákna ken awán

whether he has money or not.

napúdot ken nalamtís adín ti
yánna

cold or warm, where is it?

nakersáñġ ken nalinis ga-
tánġem

rough or smooth, buy it.

addá man inálana ken awán

whether he took some or not.

2. *Wennó* or *annó* is of general use; *wennó*, however, is more commonly used than *annó*. Examples:

<i>diak annó no baró wennó lakáy</i>	I don't know whether he is young or old.
<i>maminsán wennó maminduá</i>	once or twice.
<i>agtaráyka wennó no saán a mabalin darasém ti magná saánmo a baybay-án ti matúrog wennó aginaná</i>	run or, if it is impossible, walk fast.
<i>ití nasurók a talló wennó up-pát nga aldáw</i>	do not quit sleeping or resting.
<i>narugít man wennó saán</i>	over three or four days.
<i>aniá ti kayátmo, áso wennó púsa</i>	whether dirty or not.
<i>mapánka wennó madíka</i>	what do you like, a dog or a cat?
<i>ni Pédro ti ayabányo annó ni Juán</i>	do you go or do you refuse?
	call Peter or John.

II. "Either, whether...or" is sometimes expressed by *wennó* or *úray* repeated. Examples:

<i>wennó aramídem wennó pata-yénka</i>	either you do it or I kill you.
<i>wennó agnaéd ditóy sa agnakem wennó agáwid idiáy baláyna</i>	he either stays here and is sensible or goes back home.
<i>úray naimbág úray dákes</i>	whether good or bad.
<i>úray mayátka úray madíka</i>	whether you are willing or not.
<i>úray agsublíka ditóy úray mapánka idiáy ílim konána</i>	he says that you either come back here or go to your town.
<i>kayátko ti gumátang úray nangína úray nalaká</i>	I want to buy whether dear or cheap.

NOTE 12.—In some adverbial expressions the conjunctions "and" and "or" are omitted in Iloko. Examples:

<i>sumurók kumúrang</i>	more or less.
<i>ti bumabá ngumáto a gurigur</i>	the fever that goes up and down.
<i>bigát kasañgaaldáw madadáel</i>	it will be ruined in a couple of days; literally: tomorrow next day it is ruined.

III. THE CONJUNCTION "BUT"

I. The conjunction "but" is represented in Iloko by the adverbs *ket*, *ketdí*, *met*, and so on, and by the conjunction *ngem*.

1. The adverbs have been explained. Cfr. The Adverb. VIII. Other Adverbs. II⁴. Examples:

<i>isalakannakam ket ití dákes</i>	but deliver us from evil.
<i>inarámídda ket kenkuána dagup ti kinayátta</i>	but they treated him howsoever they liked.
<i>awán met</i>	but there is nothing.
<i>addá ketdí</i>	but he is here.

⁴ Phil. Jour. Sci. 75 (1941) 197-225.

2. *Ngem* is the ordinary conjunction. Examples:

<i>aláek komá ngem awán ti táo</i>	I should take it, but there is nobody.
<i>konák a nasiñgpet ngem adú</i>	I thought he was virtuous, but he
<i>ti dákes a kadawidna</i>	has many bad habits.
<i>ngem dika inarámid gapó ití</i>	but you didn't do it because you love
<i>ayátmo kaniák</i>	me.
<i>natan-ókda únay idi ngem</i>	formerly they were of very high
<i>nagbalinda a dákes</i>	standing, but they became bad.
<i>ngem saán a maitéd daytáy no</i>	but this will not be given if he has
<i>awán ti kaikarián kenkuána</i>	no merits.
<i>nagbírok ngem awán</i>	he looked for some, but there was
<i>ínka ngarúd ngem dika agbar-</i>	nothing.
<i>ték</i>	go, all right, but don't get drunk.
<i>madída ti agádal ngem kayát-</i>	they don't want to learn, but they
<i>da ti agay-áyam</i>	like to play.
<i>awándat toy ngem mabalín</i>	they are not here, but perhaps they
<i>nga addáda idiáy</i>	are there.
<i>madiák komá ngem napának</i>	I wanted to refuse, but I went any-
<i>met láenngen</i>	how.

NOTE 13.—*Ngem* also translates “than”, introducing the second member of a comparison. Cfr. The Adjective. II. Comparatives and Superlatives⁵, Examples:

<i>dakdakkél ngem daytáy</i>	it is larger than this.
<i>naim-ímas ti inapúy ngem ti</i>	rice is more savory than bread.
<i>tinápáy</i>	
<i>nadardarás ngem isú</i>	he is faster than he.

NOTE 14.—*Em*, an equivalent *ngem*, has become obsolete; formerly it was generally preferred when following a word ending in a consonant. Examples:

<i>aramidem em dika sumubli</i>	do it, but don't come back here
<i>ditoyen</i>	

II. After a negative or an interrogative sentence, the conjunction “but”, which in English very often includes the concept of “except”, is rendered into Iloko by:

1. *No saán* and *no saán lá(enḡ)*. Examples:

<i>saának nga immáy nanḡayáb</i>	I did not come to call the virtuous,
<i>kadagiti nasiñgpet no saán</i>	but the sinners.
<i>ketdi a kadagiti managbásol</i>	
<i>saán a ti nákemko ti matunḡ-</i>	not my will be done, but your will.
<i>pál no saán ket a ti nákem-</i>	
<i>mo</i>	
<i>saán a dagitá no saán ket a</i>	not those but these I like.
<i>dagitáy ti kayátko</i>	
<i>saán a kas ití kayátko no saán</i>	not as I will, but as you prefer it.
<i>ket a kas ití pagayatám</i>	
<i>saán láenḡ kadagiti nanḡáto</i>	not only for the high ones, but also
<i>no saán pay met kadagiti</i>	for the low ones.
<i>nababá</i>	

⁵ Anthropos 26 (1931) 477.

<i>awán no saán a dagiti táo</i>	there is nobody except the poor.
<i>a napañgláw</i>	
<i>si asino ti mayát no saán a</i>	who is willing except he who has
<i>ti addá pirákna</i>	money?
<i>awán met ti kagúrak no saán</i>	I don't hate anybody except the old
<i>la a ti lakáy</i>	man.

2. No di and no di ket no. Examples:

<i>saán a ti baláy ni Luís no di</i>	it is not Lewis' house but his rice
<i>ti tálonna</i>	field.
<i>saán a kadagiti saó ñga isúro</i>	not by the words a friend teaches,
<i>ti gayyém no di iti isúro</i>	but by what a father teaches.
<i>ti amá</i>	
<i>awáto kenkuána ti pakawán</i>	there will be no forgiveness for him,
<i>no dinto ketdi madúsa</i>	but he will rather be punished.
<i>awán ti makaammó no di ti</i>	nobody knows except his friend.
<i>gayyémna</i>	
<i>awán sabáli no di ti inapúy</i>	there is nothing else but rice.
<i>awán ti ammóda no di ket</i>	they know nothing, but they are vir-
<i>isúna láeng a nasiñgpétida</i>	tuous though.
<i>awán komá ti makaammó no</i>	nobody should know except your
<i>di ti amám</i>	father.
<i>díka aláen no di ket no síká</i>	do not take except you give some-
<i>manñtédká</i>	thing.

NOTE 15.—*Isúna lá (eñg)*, followed by the ligature *a* or *ñga*, means "but the question is that, were it not that," and so on. Examples:

<i>isúna láeñg ñga addá ditóy</i>	the question is that it is here.
<i>dákesda isúna láeñg a nabu-</i>	they are bad, but they are baptized
<i>niáganda</i>	though.
<i>isúna la ketdi a madláwko ti</i>	the question is though that I notice
<i>kaawánna</i>	his absence.
<i>kayátko komá a gatánñgen</i>	I should like to buy it were it not
<i>isúna láeñg ñga awán ti</i>	that I have no money.
<i>pirákko</i>	

V. THE CONJUNCTION "IF"

This conjunction is rendered into Iloko by:

1. No. Examples:

<i>ikkánkanto no umáyka</i>	I shall give you some if you come.
<i>ibagám no addá ni Luís</i>	tell me if Lewis is there.
<i>no addá agkatáwa, no awán</i>	if there is some, he laughs, if there
<i>agsánñgit</i>	is not, he weeps.
<i>no awán ñga agpaysó ñka gu-</i>	if there is nothing really, go and
<i>mátanñg</i>	buy.
<i>no sumanñgpét nasayáat, no</i>	if he comes home, all right, if he
<i>saán kastá met</i>	doesn't, all right also.
<i>no madí saplitem (or) sapli-</i>	if he refuses, whip him.
<i>tem no madí</i>	

NOTE 16.—The essential meaning of this conjunction is the conditional "if", but it really serves so many purposes that it might be called a con-

junction-ligature. Besides the examples which have been given under the adverbs of interrogation and under the preceding conjunction, and those that will be given under the following conjunctions, we shall add here a few characteristic ones. Examples:

<i>kásna ibuténġ no addá ma-</i>	he seems to be afraid that somebody
<i>kadláu</i>	notice it.
<i>no awán met</i>	well, there is nothing.
<i>no isú ti inbagák</i>	well, that is what I told you.
<i>no maminsán nasayáat</i>	it is good in a way.
<i>no daddúma madí</i>	sometimes he refuses.

2. *Intóno* (ordinary form), *tóno*, *attóno*, *antóno*. Cfr. The conjunction "lest" and The conjunction of time. Examples:

<i>intóno madí nġay</i>	what if he doesn't like it?
<i>intóno awán aniánto ti aramí-</i>	if there is nothing, what will you do?
<i>dem</i>	
<i>intóno makasañġpét inka pay</i>	if he arrives, will you still go?
<i>lænġ</i>	
<i>intóno agsánġit madíka nġatá</i>	if he weeps, perhaps you won't.

3. *Intó nġarúd no* (ordinary form), *attó nġarúd no*, *antó nġarúd no*. Examples:

<i>intó nġarúd no mayát agsub-</i>	if he is willing, then you will come
<i>líka</i>	back.
<i>intó nġarúd no umáy ipalú-</i>	if he comes, will you allow it then?
<i>bosmon</i>	
<i>intó nġarúd no awán an-</i>	if there is nothing, what will you do?
<i>anoém</i>	

4. *No man no*, *no kas*, *no kas no* and *nġáman no*. Examples:

<i>no man no mapettát a matáy</i>	if he dies suddenly.
<i>no man no saánna nġa annu-</i>	if he does not consent.
<i>góten</i>	
<i>no kas didanto la masapúla-</i>	if they don't find it at all.
<i>nen</i>	
<i>no kas addá bárenġ aniá</i>	if something happens.
<i>no kas no siák ti agturáy</i>	if I were the ruler.
<i>no kas no awán ti pirákko</i>	if I had no money.
<i>amañġan no addá sabáli nġa</i>	if you prefer somebody else?
<i>ipañġpanġrónam</i>	

5. *No komá no* and *no . . . komá*, introducing a conditional clause. Cfr. The Verb. Moods and Tenses. V⁶.

V. THE CONJUNCTION "BECAUSE"

I. A. The most used Iloko conjunctions representing the English "because, as", and so on, are:

1. *Ta*. Examples:

<i>díka agtákaw ta dákas</i>	do not steal, as it is bad.
<i>inarámidko daytá ta inbílin-</i>	I did that because they told me
<i>da</i>	to so.

<i>umáyak ta kayátko ti umi- núm</i>	I come because I want to drink.
<i>addá komá umáy ta adú ti kanén</i>	I wish somebody would come, as there is much food.
<i>ití mabúit agsublinto ta na- birókanna ti napúkawna</i>	he will be back soon, as he found what he lost.
<i>dayáwentayo ta kastá ti reb- béñgna</i>	let us honor him, because that is what should be done.
<i>umis-ísem ti ubiñg ta addá abalbaláyna</i>	the child smiles because it has a toy.
<i>nasiñgpétda ta inaldáw ag- luúloda</i>	they are virtuous because they pray every day.

NOTE 17.—*Ta* is a kind of general conjunction used very extensively in Iloko; it enters the composition of a great many complex conjunctions and, as a simple conjunction, it may represent the English "because, lest, that, so that", and so on. Cfr. also The Ligature *ta*. Examples:

<i>díka ikastá ta báútennakan- to</i>	do not act that way lest he whip you.
<i>aluádam ta aguñgét ti la- káy</i>	be careful lest the old man be angry.
<i>díka pidpiduáen ta masap- lítka</i>	don't do it again lest you be whipped.
<i>kitáem ta tunǵpalem</i>	see that you comply with it.
<i>íntayo ta mañgántayo</i>	let us go so that we eat.
<i>umáyka ta agságadka toy</i>	come and sweep here.
<i>ínkayo ta agsúratkayo</i>	go and write.

2. Gapò ta. Examples:

<i>madí kanó gapó ta awán ti intédyo a gongonána</i>	they say that he refuses, because you gave him no remuneration.
<i>masansán ñga umáy ditóy gapó ta isú ti kayátna</i>	he often comes here, because that is what he likes.
<i>gapó ta dagitóy ñga alldáw naidátonda a pakadayda- yáwanna</i>	because these days are conse- crated to his veneration.
<i>diak kayát a gatáñgen gapó ta diak ammó no mabaya- gakta ditóy</i>	I don't want to buy it, because I don't know if I shall stay here long.
<i>nagtálaw ní Luis gapó ta awán ti nagayoán kenkuá- na</i>	Lewis ran away, because nobody took care of him.
<i>inlákok met láenǵ gapó ta masápulko ti pirák</i>	I sold it though, because I need money.

3. Agsípud ta.

<i>agsípud ta inǵgána itá awán ti nabirókak</i>	because until now I found nothing.
<i>agsípud ta nalpásko ñga in- yáwat</i>	because I had given it already.
<i>agsípud ta dída ammó ti yánnan</i>	because they don't know any more where he is.

<i>agsípud ta dagiti táo addáda</i>	because the men are revolting.
<i>iti goló</i>	
<i>agsípud ta rabii madída ñya</i>	because it is evening they refuse
<i>umáy</i>	to come.
<i>nagtálawda agsípud ta addá</i>	they escaped because somebody told
<i>nañgibagá kadakuáda a</i>	them that you were very strict.
<i>naúyoñgka</i>	

NOTE 18.—Sometimes the conjunction *ket* may translate the English "because", and so on. Examples:

<i>umáyka ket ayabannaka ni</i>	come as father calls you.
<i>áma</i>	
<i>tulóngannak ket nadagsén</i>	help me for this is heavy.
<i>daytáy</i>	
<i>umáykat toy ket matnág</i>	come here as it is falling.

B. "On account of, for", and so on, is expressed in Iloko by the following conjunctions followed by the oblique:

1. Gapó. Examples:

<i>gapó iti dakkél únay a srib-</i>	because you are very wise, I ask
<i>mo dawátek a sursuroán-</i>	you to teach me.
<i>nak</i>	
<i>dika inarámid gapó iti ayat-</i>	you did not do it out of love for
<i>mo kaniák</i>	me.
<i>gapó iti panagsaoda</i>	on account of their talk.
<i>timmaráyda gapó iti butéñgda</i>	they ran away through fear.
<i>napán idiáy Manila gapó iti</i>	he went to Manila because he has
<i>sakit ti matána</i>	sore eyes.
<i>inayabánda idá gapó itóy</i>	they called them on account of
<i>nakalkaldáañg a gásat</i>	this sad fate.
<i>umáy gapó kenká</i>	he comes for you.

2. Agsípud. Examples:

<i>saán ñya immáy agsípud iti</i>	he did not come because he had
<i>kaawán ti pirakna</i>	no money.
<i>agsípud iti saánda a kabae-</i>	because they are not able to go.
<i>lán ti mapán</i>	
<i>agsípud iti kinaubiñgna</i>	on account of his being only a
	child.
<i>agsípud iti kinabaknáñgmo</i>	because you are rich, you should
<i>rebbéñgmo komá ti tumú-</i>	help the poor.
<i>long kadagiti napañglaw</i>	

3. Maipuón. Examples:

<i>maipuón iti butéñgna</i>	through fear.
<i>ti bannógna maipuón kenká</i>	her hard work on your account.
<i>maipuón iti sapatá nagbutéñg</i>	on account of the oath he was
<i>ket inarámidna met láeñg</i>	afraid and did it though.
<i>mabaín maipuón kadagiti ad-</i>	he is ashamed on account of the
<i>dá a kaduána</i>	companions he has.

<i>immáyak maipúon ken Ana</i>	I came for Ana.
<i>awátennanto ti sañgagasút a</i>	he will receive a hundredfold (hun-
<i>maipúon iti maysá</i>	dred for one).

C. "Therefore, wherefore", and so on, is expressed in Iloko by:

1. *Gapó ta* followed by one of the forms of the indefinite adjective in *kas*: *kastoy*, *kasta*, and so on. Examples:

<i>gapó ta kastá napán láeñg</i>	therefore he went though.
<i>gapó ta kastóy ñgarúd ara-</i>	as it is so I shall do it.
<i>midekto</i>	
<i>gapó ta kasdiáy mayátak</i>	therefore I am willing.
<i>gapó ta kastá pinatáyna</i>	wherefore he killed him.

2. *Isú ti gapóna*, ordinarily followed by the ligature *a* or *ña*. Examples:

<i>isú ti gapóna ñga immáy-</i>	therefore we came.
<i>kami</i>	
<i>isút gapóna dawátenmi komá</i>	therefore we should like to ask
<i>kadakayó a dikay komá</i>	you not to sell it.
<i>iláko</i>	
<i>dákes daytá isút gapóna bay-</i>	that is bad, therefore leave it.
<i>bay-ám</i>	
<i>immáy idi kalmán isút gapó-</i>	he came yesterday, therefore we
<i>na mapankami no bigát</i>	go to-morrow.
<i>masakit ti ñgipenna, isút ga-</i>	he has the toothache, therefore he
<i>póna ñga agikkis</i>	shrieks.

3. *Anansá* and *anansá ñgarúd*, ordinarily followed by *ta*. Examples:

<i>anansá ta no ta ñgipenmo</i>	wherefore, if your teeth ache, you
<i>agsakit agpaágaska</i>	go to the dentist.
<i>anansá ta inkan</i>	wherefore go no
<i>anansá ta dawátek a tuló-</i>	therefore I ask you to help me.
<i>ñgannak</i>	
<i>anansá ta no apparintúmeñg-</i>	therefore if you kneel down, all
<i>ka kúkuamto ámin idá</i>	of them will be yours.
<i>isú ti apóm anansá ta addá</i>	he is your master, therefore he
<i>kalintegánna kenká</i>	has a claim upon you.
<i>anansá ñgarúd a konák ken-</i>	therefore I tell you.
<i>ká</i>	
<i>anansá ñgarúd diak bum-</i>	therefore I am not afraid to go.
<i>déñg a mapán</i>	

4. *Isú ti*. Examples:

<i>isú ti kumákaasikam kenká</i>	therefore we implore you.
<i>isú ti umáyak kenká ta addá</i>	I came to you because I have
<i>ibagák</i>	something to tell.
<i>addá básolna kaniák, isú ti</i>	he wronged me, therefore I whip-
<i>sinaplitko</i>	ped him.

5. *Kárig pay ta* and *kárig kad ta* (rarely used). Examples:

<i>kárig pay ta díka sumuknál</i>	therefore you do not visit me who
<i>kaniák a masakít</i>	am ill.
<i>kárig kad ta adú ti makí-</i>	therefore I see many men.
<i>tak a táo</i>	

II. A very common expression is a word with the form of the future in *to* followed by the adverb *met*, and generally introduced by the conjunction *no*. This expression is hard to translate into English: it implies a kind of excuse for something being done or omitted. Examples:

<i>no kumagátto met</i>	but he bites (how could I approach him?)
<i>no kasdiáyto met</i>	but he is such a one (how could I ?)
<i>no agunǵétto met</i>	he gets angry (how can we ?)
<i>no addánto met nakataktá-</i>	I was delayed (that is why I am
<i>kak</i>	late).
<i>no adúnto met ti mapán</i>	so many people go (why should I?)
<i>no awánto met ti immáy</i>	well, nobody came (now can we?)
<i>agkuddótkanto met</i>	but you nip.

III. The following conjunctions might be translated "whereas, while", and so on:

1. *Ata, yáta, antá* and *yantá*. Examples:

<i>áta saánkó nǵa ammó ti tim-</i>	whereas I could not imitate your
<i>múlad kenká ití sinǵpet-</i>	virtue, ask forgiveness for me.
<i>mo, idawdawátannak ití</i>	
<i>pakawan</i>	
<i>yáta nasapulám kuámon</i>	whereas you found it, it is yours
	now.
<i>antá nabóonǵmo agsásaoka</i>	you broke it and still you talk.
<i>pay láenǵ</i>	
<i>antá naarámíd bay-ámon</i>	it is done now, leave it.
<i>antá kastá met láenǵ a ma-</i>	whereas it so happens that he re-
<i>dí intayon</i>	fuses, let us go.
<i>yantá ayaténnak ikkánnak ti</i>	whereas you love me, give me
<i>dawátek</i>	what I ask.
<i>yantá kúkuam ánim ayoá-</i>	whereas everything is yours, take
<i>nam nǵarúd</i>	care of it.

2. *Tanǵay, atanǵay, antanǵay* and *yantanǵay*, Examples:

<i>tanǵay immáykayo tuǵpa-</i>	whereas you came, I shall comply
<i>lek ti inkarik</i>	with my promise.
<i>antanǵay naúram ámin reb-</i>	whereas everything is burnt, we
<i>bénǵtay ti umális</i>	shall have to move.
<i>antanǵay awan ti pirakmo</i>	whereas you have no money, don't
<i>diká ngarud gatangen</i>	buy it of course.
<i>yantanǵay isút naglikudán-</i>	whereas you turned your back on
<i>yo</i>	it.

<i>ket yantánṅgay kastán a dí-</i>	and whereas it is now so that we
<i>tay maipamuspúsan</i>	cannot remedy it.
<i>yantánṅgay ket díka ammó a</i>	but whereas you cannot refuse him
<i>paidáman</i>	anything.
<i>awán duadua a madí yan-</i>	there is no doubt about his refus-
<i>tánṅgay saán ṅga immáy</i>	al, as he did not come.

3. *Idinto* (past) and *itá* (present) followed by the ligature *ta*, *a* or *ṅga*. Examples:

<i>idinto ta natáy ni Júan</i>	whereas John died.
<i>ket idinto ta simmálug ni</i>	and whereas your father went
<i>áma</i>	down.
<i>idinto ta malémen</i>	whereas it was afternoon already.
<i>idinto ṅga addá ti lakáy</i>	whereas the old man was there.
<i>ket idinto a dagiti kaaró-</i>	whereas our neighbors went to
<i>bami napánda nagáni</i>	harvest rice.
<i>idinto ṅga ammóna ti panú-</i>	whereas he knew their thoughts,
<i>notna kinonána</i>	he said.
<i>itá ta awándan aniá ti ara-</i>	now that they are gone what shall
<i>mídek</i>	I do?
<i>itá ta lakáyen madí ṅga ag-</i>	now that he is old he refuses to
<i>saríta</i>	tell stories.
<i>itá ta simmanṅpet inkan</i>	now that he arrived you can go.

IV. The following conjunctions represent the notion of the English "while, besides", and so on: *abús ta* and *abús man pay (ta)*. Examples:

<i>abús ta isú ti makabásol</i>	he is the one who makes the mis-
<i>isú pay ti agunṅét</i>	take and, besides, he is the one
	who gets angry.
<i>abús ta tinakáwandak indak</i>	they robbed me, they also whipped
<i>pay bináut</i>	me.
<i>isakitko daytá, abús ta isú</i>	I defend him, as he is also one of
<i>maysá kadagiti gayyémko</i>	my friends.
<i>madikami a manṅtarakén</i>	we don't want to feed them, and
<i>kadakuáda abús ta bassit</i>	we have little rice also.
<i>ti págaymi</i>	
<i>diak kayát ti mapán abús ta</i>	I have no money and, besides, I
<i>awán ti pirákko</i>	don't want to go.
<i>ínka mettén abús ta malé-</i>	go now and by this time it is
<i>men</i>	afternoon also.
<i>awán ti mayát abús ta túdo</i>	it does not do anything but rain
<i>la a túdo</i>	and besides, nobody is willing.
<i>díka mapán ta abús ta awán</i>	don't go, you have no permission
<i>ti palúbosmo nabasá pay</i>	and, besides, the road is wet.
<i>ti dalán</i>	
<i>abús man pay paturdénna ti</i>	and, besides, he makes men bold.
<i>táo</i>	

NOTE 19.—After *abús kúa* the sentence seems to be suspended Examples:

<i>abuskuá dakes ti dalan</i>	and then also . . ., the road is bad.
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VI. THE CONJUNCTION "ALTHOUGH"

I. A. The most used Iloko conjunctions representing the English "although, even though", and so on, are:

1. *Uray, úray no, úray la no, úray pay no, úray man and úray man no.* Examples:

<i>úray awán ti baláymi</i>	although we have no house.
<i>úray nagbalínda a dákés</i>	although they became bad.
<i>úray natáy dítay ilunód</i>	let us not curse him even though he is dead.
<i>úray simmanǵpet</i>	although he came.
<i>úray no guráendak</i>	even though they hate me.
<i>úray no madikayo</i>	even though you refuse.
<i>úray no agtálaw</i>	even though he run away.
<i>úray la no konám a dákés</i>	I shall do it notwithstanding you say it is bad.
<i>aramídekto met láenǵ</i>	even though he weep he must come.
<i>úray pay no agsánǵit reb-bénǵna ti umáy</i>	even though they whip me.
<i>úray pay no baútennak</i>	even though you come I won't give you anything.
<i>úray man umáyka awánto ti itédko</i>	even though the old man be willing.
<i>úray man no mayát ti lakáy</i>	

2. *Nópay, nópay no, no man pay and no man pay no.* Examples:

<i>nópay bakanánǵka</i>	although you are rich.
<i>nópay natañgsít bassit no daddúma</i>	although he is a little proud sometimes.
<i>nópay adú ti pírákmo</i>	although you have much money.
<i>nópay awán dítoy ti gayyém-ko</i>	although my friend is absent.
<i>nópay saán a nalukmég</i>	although he is not fat.
<i>nópay no ikkánnak íbzgák-to met láenǵ a naímut</i>	even though he gives me, I shall say nevertheless that he is a miser.
<i>no man pay saán únay nǵa adú ti táo</i>	although there were not very many people.
<i>no man pay napánda idiáy nagsakítida met láenǵ</i>	although they went there, they got ill anyhow.
<i>no man pay no adúda</i>	even though they be many.

B. "Nevertheless", and so on, is expressed in Iloko by *nópay* or *nópay no* followed by one of the forms of the indefinite adjective in *kas*: *kastá, kastóy*, and so on. Examples:

<i>nópay kastá nasínǵpét met lá-enǵ ti konák</i>	nevertheless I think he is virtuous.
<i>nópay kastá daytá a pagkuránǵgan mapunnoánto met lá-láenǵ</i>	nevertheless that want will be supplied.

<i>nópay kasdiáy innakto tu-lónġan</i>	although it is so, I shall go to help him.
<i>nopay no kastá adúnto met láenġ</i>	however, there will be many anyhow.
<i>nópay no kastá awán ti bibianġ mo</i>	however, it is not your business.
<i>nópay no kastá saún ġġa ugnanáyon a masurot daytáy</i>	nevertheless this is not always followed.

II. With the infix *imm* and the suffix *an*, and occasional reduplication of the first open syllable of the stem together with the next consonant if there is any, the Iloko forms a kind of conjunctive phrase which includes the concept of the English "although", provided of course that another clause, introduced by *ket*, follow or be understood. Examples:

<i>limmalakiánka ket natak-rótka</i>	although you are a man you are timid.
<i>simmayaátan pay ti saó ket dída ikankanó</i>	although we speak nicely they do not heed it.
<i>bimmabaiánka ket uminám-ka ití árak</i>	although you are a woman you drink wine.
<i>immaduán ubbíġ ket awán pay manġmanġġég</i>	although there are many children nothing is heard.
<i>bimmassitán a tattáo ket napúdot</i>	although there are few people around, still it is hot.
<i>pimmigpigsáankayo ket sa-áyo a maidurón</i>	although you are strong you cannot push it.
<i>limmaklakayánda ket inuu-biġán ti arámidda</i>	they are old men, however they act like children.
<i>kimmappapúyan ket kayátna a bagkáten</i>	he is weak and still he wants to lift it.

VII. THE CONJUNCTION "LEST"

This conjunction is expressed in Iloko by:

1. *Intóno* (ordinary form), *tóno*, *attóno* and *antóno*. Examples:

<i>maðiak intono aguġét</i>	I won't lest he get angry.
<i>tóno maikkátak</i>	lest I be discharged.
<i>attóno pagtalawennak</i>	lest he drive me out.
<i>bayám antóno madi</i>	leave it, what if he refuses?
<i>ínka intóno saplitenak</i>	go lest he whip you.
<i>umáykami dtáy intóno pumatáyda ketdín idiáy</i>	we come here lest they kill us there.
<i>darasém intóno kamátennak</i>	be quick lest he catch you.
<i>aluádanyo intono makitada</i>	be careful lest they see it.
<i>ibusém intono madlawda ti kaaddána</i>	finish it lest they notice its presence.

2. *Wennó* and *annó* (rarely used). Examples:

<i>ta wennó isúdanto no kúa ti</i>	lest they be the greatest after-
<i>kadadakkelán</i>	wards.
<i>ibusém ti tinápay annó pu-</i>	finish the bread lest the cat eat
<i>sáen</i>	it.

3. *Intó (la) ket (dí) no, adtó* (or: *attó*) *(la) ket (dí) no* and *antó (la) ket(dí) no*. Examples:

<i>rikpánna intó ket no sumrék</i>	he closes it lest she enter.
<i>agtaráyka intó ketdí no isú</i>	run lest he be the first.
<i>ti umoná</i>	
<i>intó la ket no masulísog</i>	lest he be tempted.
<i>aláemon intó la ketdí no</i>	take it now lest he refuses to-
<i>madi no bigát</i>	morrow.
<i>itúgotmo ti páyonǵ adtó ket</i>	take an umbrella with you, it
<i>no tumúdo</i>	might rain.
<i>sibugám attó ketdí no matáy</i>	water it lest it die.
<i>igálutmo attó la ket no tu-</i>	tie him lest he run away.
<i>maráy</i>	
<i>ipaǵínam attó la ketdí no</i>	augment its price lest he buy it.
<i>gatánǵenna</i>	
<i>ínka itá antó ket no marik-</i>	go now, it might be closed this
<i>pán no malém</i>	afternoon.
<i>siká komá antó ketdí no sa-</i>	you should, so that nobody else can
<i>báli ti makaála</i>	take it.
<i>ínka ibagá antó lá ket no</i>	go and tell him lest they arrive.
<i>sumanǵpetda</i>	
<i>ínka antó la ketdí no umáy</i>	go lest he come here.
<i>ditóy</i>	

NOTE 20.—The conjunction *ánnó (la) ket (dí) no, no lá (eǵ) no* and *ket saán (ǵ) em* have become more or less antiquated. Examples:

Examples:

<i>darasém ta annó la ket no</i>	be quick lest the old man get there
<i>maon-onáánnata ti lakáy</i>	before we do.
<i>íntayon ket saán ǵem ma-</i>	let us go lest it be afternoon.
<i>lémen</i>	

4. *Di la ket, di la ket anó, di la (ket) mamin-anó* and *di la ket agkapin-anó*, generally followed by *ta*. Examples:

<i>di la ket ta mapárutyo ti</i>	lest you pull up the rice.
<i>págay</i>	
<i>di la ket ta pumanǵláwka</i>	lest you become poorer.
<i>di la ket ta mabaybay-ántayo</i>	lest we be left out.
<i>di la ket anó ta masarókan-</i>	lest they find it and run away
<i>da sáda itaráy</i>	with it.
<i>di la mamin-anó ǵga awá-</i>	lest there be nothing left.
<i>nen</i>	
<i>di la mamin-anó ǵga addá</i>	lest somebody take what we don't
<i>manǵála ití saánmi a ka-</i>	like.
<i>yát</i>	

<i>di la ket mamin-anó ta puká-wenna idá</i>	lest he destroy them.
<i>di la ket agkapin-anó ta sumrékda iti unég ti baláy</i>	lest they enter the house.

5. *Aniá ket, aniá la ket, aniá ketdí* and *aniá la ketdí*, generally followed by *ta*. Cfr. XII. Other Conjunctions. 1. Examples:

<i>ikkatém aniá ket ta payáten-da idá</i>	take them away, lest they trample on them.
<i>aniá la ket ta masarákanda-ka a silalábus</i>	what if they find you naked?
<i>aniá ketdí ta baútennakayo</i>	lest he whip you.
<i>aniá la ketdí ta ti kabúsor-mo yáwainaka iti okóm</i>	lest your enemy deliver you to the judge.
<i>aniá la ketdí ta intón dum-téng iti maktáat masará-kannakayo a matmatúrog</i>	lest, when he comes unexpectedly, he find you asleep.
<i>aniá la ketdí ta parútenyo ti págay</i>	lest you pull up the rice.
<i>aniá la ketdí ta addá maa-ramid a riribuk</i>	lest a disturbance take place.
<i>aniá la ketdí ta umáy</i>	lest he come.

VIII. THE CONJUNCTION "PROVIDED"

I. The conjunction "provided" is rendered into Iloko by:

1. *No la ket(dí)* and *no la ket(dí) no*. Examples:

<i>no la ketdí napudnó</i>	provided that it be true.
<i>no la ketdí saán a maisupiat iti pagimbagántayo</i>	provided that it be not against our own good.
<i>no la ketdí awán ti sumanǵ-pét itá agay-áyamtayo</i>	if nobody arrives now, we shall play.
<i>no dagiti paspásigko díka la ket idá kaúma</i>	provided that you do not get tired of my familiarity.
<i>no la ket no diak makaará-mid iti básol</i>	provided that I commit no sin.
<i>no la ket no diak ranǵásan ti gayyémko</i>	provided that I do not injure my friend.
<i>no la ketdí no addá pirákko</i>	provided that I have money.

2. *No ... la* and *no ... la ket(dí)*. Examples:

<i>no bumaknǵ la dagitá a kas iti konám</i>	provided that those ones become rich as you say.
<i>no sipapakuraǵ la ketdí</i>	provided that he be humble.
<i>no mayát la ketdí ti bakét-mo umáyka</i>	provided that your wife agree, come.
<i>no awán la ketdí ti tímél matúrogkami idiáy</i>	provided there are no fleas, we shall sleep there.
<i>mayátak no awán la ketdí ti sakítko</i>	I am willing provided I am not ill.

II. The Iloko conjunctions *bárenḡ* (*pay*) and *bárenḡ* (*pay*) *no* express a wish, but at the same time include a certain doubt about the expected result, like the English: let us hope that. Examples:

<i>bárenḡ díkanto agsagsagába</i>	let us hope you won't suffer.
<i>bárenḡ pakawanénna</i>	if perhaps he forgive it.
<i>bárenḡ ipalúbosna</i>	if perhaps he allow it.
<i>bárenḡ pay maikkát ti sa-kitna</i>	let us hope that his illness will leave him.
<i>bárenḡ no mayát</i>	let us hope he'll be willing.
<i>ínka bárenḡ no masapulám</i>	go, you may perhaps find what
<i>ti napúkawmo</i>	you lost.
<i>umasidégak bárenḡ pay no</i>	I approach hoping he will give me
<i>addá met itédna kaniák</i>	some also.

IX. THE CONJUNCTION "CONCERNING"

I. The typical conjunctions to express this concept in Iloko are:

1. (*Ití*) *maipapán* and *no maipapán*, followed by the oblique. Examples:

<i>ití maipapán kadakayó</i>	concerning you.
<i>adú ti inbagána maipapán</i>	he said much about the death of
<i>ití ipapatáy daydí ubiḡ</i>	that child.
<i>awán ti saómi maipapán ití</i>	we said nothing about that.
<i>daytá</i>	
<i>maipapán ití panagdúyosda</i>	concerning their protecting the
<i>ití makipalpalamá ṅga ag-</i>	beggars who come from other
<i>gapót sabáli ṅga il-ili</i>	towns.
<i>no maipapán ití anákmo awán</i>	I heard nothing concerning your
<i>ti nadámagko</i>	son.
<i>no maipapán ití baláy a gi-</i>	concerning the house I bought, I
<i>nátaṅko awán met kanó</i>	heard there was no granary
<i>agámaṅna</i>	with it.

2. *Agpapán pay*. Cfr. The Adverb. VIII. Other Adverbs. I. 3; The Preposition. III. 1⁷; Conjunctions of Time. 8. Examples:

<i>agpapán pay mapúkawmo na-</i>	as regards what you lost, they say
<i>rigatto kanó a mabirókan</i>	that it will be difficult to find it.

NOTE 21.—(*Ití*) *maipaṅgép* and *no maipaṅgép* mean either "concerning" or "in behalf of". Examples:

<i>adú ti inpalawáña maipaṅ-</i>	he related much concerning the
<i>gép ití pannakaúram ti ba-</i>	burning of his house.
<i>láyna</i>	
<i>no maipaṅgép ití nadámag-</i>	as regards what I heard, it is this.
<i>ko kastóy</i>	

⁷ Philip. Jour. Sci. 75 (1941) 197-225.

ibagák daytá maipaṅggép ken ina I say that in behalf of my mother.
maipaṅggép ití simbáan for the church.

II. A common way of expressing the concept "concerning" is the simple conjunction *no*. Examples:

no kananákemko a maysá as to my opinion.
no kaniák a maysá concerning myself.
no siák a maysá concerning myself.
no ni ina ammók a madi as to my mother, I know that she refuses.
no isáda mabalín a mapánda as to them, maybe they go.

III. The concept "concerning" is sometimes expressed by the oblique in a kind of opposition preceding the sentence. Examples:

ití maikapát awán ti ammók concerning the fourth, I know nothing.
ití laláki napigpigsá ṅgem ti babái concerning the man, he is stronger than the woman.
kaniák a maysá nasayáat ámin to me everything is good.
ití ásom nalukmég concerning your dog, he is fat.
ití baláyko nalpásen as regards my house, it is finished.
ití saóyo naalás concerning your speech, it is unbecoming.

X. CONJUNCTIONS OF TIME

1. To introduce a clause in the past: *idí* followed or not by the ligature *ta*, *a* or *ṅga*. Cfr. The Verb. Moods and Tenses. I. 2⁸.

idí ta nabisin nagsaṅgsaṅgit when he was hungry he wept.
idí ta nagáwid limmábas when he went home he passed our house.
idí a kastá dagiti saṅgapúlo napánda then the ten went.
idí ṅga inayabánnak inpala-wágná ámin when he called me he explained everything.
idí dimmatéṅg napalálo ti bannógná when he arrived he was very much tired.
idí awánkami nagtálaw when we were gone he escaped.

2. To introduce a clause in the future: *intóno*, *tóno*, *no*, *attóno* and *antóno*. Cfr. The Verb. Moods and Tenses. III. 1⁹.

3. To connect two clauses, the first of which precedes the second one in time: *sa* and *sáto*. Cfr. The Verb. Moods and Tenses. IV 10.

⁸ Philip. Jour. Sci. 75 (1941) 197-225.

⁹ Philip. Jour. Sci. 75 (1941) 198.

¹⁰ Philip. Jour. Sci. 75 (1941) 199.

4. "After" is expressed by (*iti*) *kalpasán* and (*iti*) *kalabsán*, followed by the genitive. Examples:

<i>kalpasán ti panagsúratmo</i>	after you have written send my
<i>ipaw-itmo ti súratko</i>	letter.
<i>kalpasán ti pannánġán</i>	after meals.
<i>iti kalpasán ti panagsánġit-</i> <i>da nagkatáwada</i>	after they had wept they laughed.
<i>iti kalpasánda ámin</i>	after all of them.
<i>iti kalpasánna agúnġarakto</i>	afterwards I shall arise from the dead.
<i>kalpasán ti talló nġa aldáw</i> <i>umáyakto</i>	after three days I shall come.

5. "Before" is expressed by:

a. (*Iti*) *kasañġoánan* and (*iti*) *kasakbáyan*, followed by the genitive. Examples:

<i>kasañġoánan ti ipapatayna</i> <i>nagluálo</i>	he prayed before he died.
<i>iti kasañġoánan ti yadyko</i> <i>ditóy maymaysá ti baláy</i>	before I came here there was only one house.
<i>kasakbáyan ti panagdáwatyo</i> <i>rebbénġmo ti agságad iti</i> <i>kasakbáyan ti panagádal-</i> <i>mo</i>	before you ask. you must sweep it before you study.
<i>iti kasakbáyanna nasiñġpét</i>	he was virtuous before.

b. *Sakbáy*, followed by the genitive. Examples:

<i>iti rabií a sakbáy ti ipapán-</i> <i>mo</i>	the evening before you went.
<i>iti aldáw a sakbáy ti isasañġ-</i> <i>pétmo</i>	the day before you arrived.
<i>sakbáy toy awán ti mayát</i>	before this nobody was willing.

c. Some negative expressions in the past tense. Examples:

<i>itá ta di pay natáy</i>	before he dies.
<i>itá ta awán pay ti immáy</i>	before anybody comes.
<i>natáy idi di pay nalpás ti</i> <i>baláyna</i>	he died before this house was finished.
<i>saán ket a di nagkarí</i>	not before he promises.

6. "During" is generally expressed (*iti*) *bayat ti*. Examples:

<i>bayat ti kaaddám ditóy</i>	during your stay here.
<i>bayat ti duá nġa aldáw awán</i> <i>ti kinnánna</i>	he did not eat anything for two days.
<i>nagsánġit iti bayat ti panag-</i> <i>sarítak</i>	he wept while I talked.
<i>iti bayat sañġagasút a tawén</i>	for one hundred years.

7. "Till" and "since" are expressed by: *inġgá(t)*, *inġgána(t)*, *aginġgá(t)* and *aginġgána(t)*, followed or not by *ti*, *iti*, *di*, *ti di*, *iti di*, *ti saán*, *iti saán* or *idi*. If the subordinate clause is

in the present, the conjunction means "till"; if it is in the past, the context must show whether it means "till" or "since".
Cfr. The Preposition. III. 3¹¹. Examples:

<i>in̄ggát dina maasáas</i>	till he has learnt it thoroughly.
<i>in̄ggánat matáyak</i>	till I die.
<i>in̄ggánat aggibus ti lúboñg</i>	till the end of the world.
<i>in̄ggánat ti dina masarákan</i>	till he finds what he lost.
<i>ti napúkawna</i>	
<i>didanto maramanán ni patáy</i>	they will not taste death till they
<i>in̄ggána iti didak makita</i>	see me.
<i>in̄ggána iti dumtén̄g</i>	until he arrives.
<i>agsápulkayo in̄ggána iti díak</i>	look for it till I arrive.
<i>dumtén̄g</i>	
<i>awán ti pan̄gibagaánda in̄g-</i>	they tell nobody until it is finished.
<i>gána iti di malpás</i>	
<i>in̄ggána iti panagbiágna</i>	during his life.
<i>in̄ggána iti manó ñga alldáw</i>	until many days are passed.
<i>ti palabsénna</i>	
<i>in̄ggána iti lumábas ti lán̄git</i>	till heaven and earth pass.
<i>ken dagá</i>	
<i>in̄ggánat iti mabayádan ámin</i>	till everything is paid.
<i>in̄ggána iti panagápít</i>	until the time of the harvest.
<i>in̄ggána iti ikábilko dagiti</i>	till I put your enemies your foot-
<i>kabúsormo a pagbatayán</i>	stool.
<i>dagiti saksákam</i>	
<i>agiñggá ti makapan̄gának ken</i>	till I eat and drink.
<i>makainúmak</i>	
<i>agiñggát mabayádan ámin</i>	till you have paid everything.
<i>agiñggá di agmagá</i>	till it dries.
<i>agiñggá iti maikkát</i>	till it is gone.
<i>nagyan toy in̄ggánat ti saún</i>	he stayed here until the bread was
<i>a nalúto ti tinápay</i>	baked.
<i>agsiñgpétka in̄ggánat iti díka</i>	be virtuous until you die.
<i>matáy</i>	
<i>nagbásolda agiñggá iti immáy</i>	they sinned till the deluge came.
<i>ti layús</i>	
<i>saúnda a namáti agiñggá ti</i>	they did not believe till they called
<i>inayabánda dagiti naga-</i>	his parents.
<i>nák kenkuána</i>	
<i>nalukmég agiñggát inpas-</i>	she was fat until she brought forth
<i>ñgáyna ti anákna</i>	her child.
<i>isú ti nagtaen̄gak agiñggá</i>	I dwelt there until the old man
<i>idí ipapatáy ti lakáy</i>	died.
<i>bimmassít la a bimmassít ti</i>	his money diminished all the time
<i>pirákna in̄ggánat nagsar-</i>	till he stopped drinking.
<i>dén̄g ti panaginúmna</i>	
<i>in̄ggánat nagsardén̄g ti pa-</i>	since he stopped drinking his money
<i>naginúmna umadú la ñga</i>	augments all the time.
<i>umadú ti pirákna</i>	

¹¹ Philip. Jour. Sci. 75 (1941) 197-225.

<i>inġganat nagsardēng ti pa-</i>	since he stopped drinking his money
<i>naginúmna immadú la nġa</i>	augments all the time.
<i>immadú ti pirákna</i>	
<i>inġgána idi ipapatáyna awán</i>	since he died we have no more
<i>ti gásatmin</i>	luck.
<i>inġgána idi inbagák nasiñg-</i>	since I told him he is virtuous
<i>pét mettén</i>	though.

NOTE 22.—As may be seen by the above examples, the negation generally does not affect the meaning of the sentence. The reason is this: *inġgana* means literally “its end”; now if you say *inġganat natáy*, you mean “his death was the end, till he died”. In the first sentence, you analyze the original meaning of the conjunction and place the stress on “the end”; in the second sentence, you take the conjunction simply as a conjunction and place the stress on “the period of duration”. In practice both forms are equivalent.

And so also with *agiñggá*, which means literally, “it ends”. *Agiñggát natáy*, “it ended in his death, till he died”; *agiñggat di natáy*, “as long as he did not die, till he died”.

NOTE 23.—These conjunctions sometimes convey the notion of the English “during, as long as,” as may be seen by the above examples and by the explanation given in the preceding note.

8. “Till” is also expressed by *agpapán* followed by a term that includes the notion of the present or of the future; “since” is also expressed by *manípud idi* or *sipud idi* followed by a term that includes the notion of the past. Cfr. The Preposition. II. 2. b. and III. 1¹². Examples:

<i>agbasbása agpapán agsápa</i>	he reads till early in the morning.
<i>agpapánto ti panagsúratmo</i>	till when will you write.
<i>manípud idi simmanġpet</i>	since he came he has done nothing
<i>awán ti sabáli nġa inará-</i>	but weep.
<i>midna nġem ti agsángit</i>	
<i>manípud idi immáy</i>	since he came.

9. “Whenever” is expressed by: *patináyon no*, *ámin no*, and *tumuñggal*. Examples:

<i>patináyon no umay ditoy addá</i>	whenever he comes here he bites
<i>kagaténa nġa ubing</i>	a child.
<i>adú ti kótomi patináyon no</i>	we have many lice whenever you
<i>addákayo</i>	are here.
<i>patináyon no makítak na-</i>	every time I see him he is drunk.
<i>barték</i>	
<i>ámin no addáka ditóy agkú-</i>	whenever you are here we lack
<i>rañg ti kanénmi</i>	food.
<i>tuñggál malagípkayo</i>	whenever I remember you.
<i>tumuñggál balikséna dagi-</i>	every time he pronounces these
<i>tóy a saó</i>	words.
<i>tumuñggál lualoéntayo day-</i>	whenever we recite this prayer.
<i>tóy</i>	

¹² Philip. Jour. Sci. 75 (1941) 197-225.

10. "As soon as" is expressed by *apáman*, followed by the ligature *a* or *nga*. Examples:

<i>apáman a malpás ti pompón</i>	as soon as the burial is over let
<i>intayo</i>	us go.
<i>apáman nga apagsaóna day-</i>	he had scarcely said this.
<i>tóy</i>	
<i>apáman a nakakaán nagsakit</i>	he had scarcely finished eating
	when he got ill.

XI. CONJUNCTIONS OF COMPARISON

I "As, like", are expressed by:

1. (a) *kas*, (a) *kas lá(enḡ)*, (a) *kas man* and (a) *kas man lá(enḡ)*, followed or not by the oblique. Examples:

<i>kas pay isú ti yan ti kus-</i>	that seems to be the reason of
<i>páгда</i>	their self-conceit.
<i>panagaw-awatko kásna kayát</i>	as I understand it, he wants to
<i>a gatánḡen ti balayko</i>	buy my house.
<i>kásna naawán ti ladínḡitna</i>	he seemed to have cast off his
	sorrow.
<i>kas addá tultúlenḡna</i>	he seems to be a little deaf.
<i>kásna paluknenḡén</i>	he seems to soften it.
<i>rugiákto ti kas manḡrikná</i>	I shall begin to sound my uncle
<i>ken ulitéḡko</i>	(to act like sounding).
<i>maarámid kenká kas pagaya-</i>	what you like is done to you.
<i>tám</i>	
<i>kásdanto kadakamí</i>	they will be like us.
<i>kas iti ubiḡ</i>	like the child.
<i>aláem ti kas itédko kenkuá-</i>	take the same as what I give to
<i>na</i>	him.
<i>kas ipalawág ti lakáy</i>	as the old man explains.
<i>kásna tandá</i>	as a sign of it.
<i>a kas aniniwan</i>	like a shadow.
<i>a kas maysá a taném</i>	like a grave.
<i>a kas iti panaḡḡinanámak</i>	as I always hope in you.
<i>kenkát agnanáyon</i>	
<i>a kas iti konám</i>	as you say.
<i>a kas kamiák met ditóy</i>	like me here also.
<i>a kas ket sakitén ti nákemda</i>	they seem to feel sorry about it.
<i>ti umoná a kas ket iti maúdi</i>	the first is like the last.
<i>a kas idi kagugapóna</i>	as in the beginning.
<i>naidarúm a kas agdadáel ka-</i>	he was accused of destroying her
<i>dagiti kúkuana</i>	property.
<i>a kas nasinḡpét</i>	like virtuous (he seems to be vir-
	tuous).
<i>a kas ken amána</i>	like his father.
<i>a kas itá</i>	like now.
<i>kásnak la anák</i>	I am like a child to him.
<i>kas met la idi</i>	just like before.
<i>kas láak tumayáb</i>	I seem to fly.
<i>kas la kastá</i>	it looks like it.
<i>kas lat itáy</i>	like a while ago.

<i>no ti nam-áymo ñga agbiág</i>	may you live in ease and abun-
<i>ta kas la komá ití pusak-</i>	dance, a life comparable to the
<i>sák ken ayamóom sabsá-</i>	purity and fragrance of the
<i>bunġ dagiti ar-arapáapko</i>	flowers of my fancy.
<i>a kakás la táo</i>	as men.
<i>táo a kas la kaykáyo</i>	men like trees.
<i>kas man díak umáy ditóy</i>	as if I don't come here.
<i>kas man la díka makagun-</i>	you seem not to be able to get it.
<i>ód</i>	

2. (*k*)árig, (*k*)árig lá(*eñġ*), (*k*)árig man and (*k*)árig man lá(*eñġ*), followed or not by the ligature *ta*, *a* or *ña*. Examples:

<i>árig a táo a magmagná</i>	like a man who walks.
<i>dagitóy árigda ñga agasáwa</i>	these ones look like a married couple.
<i>kárig la matmatúrog</i>	he seems to be asleep.
<i>árig la a bató</i>	like stone.
<i>árigkayo la ñga agsadút</i>	you look lazy.
<i>árig la ta madí</i>	he seems to refuse.
<i>árig man a díak kayát</i>	I think I won't.
<i>árig man ñga addá ammóna</i>	as if he knew something.
<i>árig man la dína kayát</i>	as if he didn't like it.

3. (*Ka*)páda and (*ka*)padpáda, followed by the genitive. Examples:

<i>kapádak daydiáy</i>	that one is like me.
<i>kapádada la únay dagiti baláy idiáy ilimi</i>	the houses in our town are just like them.
<i>kapadpáda ti ásomí</i>	he is like our dog.

II. 1. "As . . . as" is expressed by:

a. *a kas* and *a kas lá(eñġ)*, followed by the oblique.

Examples:

<i>naimbág a kas kaniák</i>	as good as I.
<i>nasinġpét a kas ití anákko</i>	as virtuous as my child.
<i>nasadút a kas ken Ana.</i>	as lazy as Ann.
<i>natakrót a kas la ugsá</i>	as timid as a deer.
<i>uminúmka a kas la sarañgósonġ</i>	you drink as much as a funnel.

b. the terms (*ag*)páda, (*ag*)papáda, (*ag*)padpáda and (*ag*)padapáda (past: *nag* . . .). Examples:

<i>pádada a nasinġpét</i>	he is as virtuous as they.
<i>ti pádak a táo</i>	my neighbor (literally: a man like me).
<i>agpapádada a naimbág</i>	the one is as good as the other (they are equally good).
<i>padpádana a masirib</i>	he is as wise as he.
<i>agpadpádakayo a nasadút</i>	you are both equally lazy.
<i>padapádada ñga ur-úray</i>	he is as worthless as they.
<i>nagpadapádada a dúkes</i>	these ones were as bad as the others.

2. "Not so . . . as" is expressed by:

a. a negative followed by *a kas* or *a kas lá (eñg)*. Examples:

<i>saán a kas iti baláyko</i>	it is not so (good) as my house.
<i>saán a kas ken Ana</i>	she is not so (active) as Ann.

b. a comparative adjective indicating the reverse quality. Examples:

<i>dakdákes ñgem ti baláyko</i>	it is worse than my house (not so good).
<i>nasadsadút ñgem ni Ana</i>	she is lazier than Ann (not so active).

III. 1. "As . . . so" is expressed by (a) *kas . . . kastá met* and *no kasanó . . . kastá met*. Examples:

<i>kas iti naarámid kadagidí aldáw ni David kastáto met ti maarámid no kuá kas sadi lañgit kastá met di- táy dagá</i>	what happened in the days of David, the same will happen then. as in heaven so also here on earth.
<i>kas iti kinaadú ti kinabak- nángmo kastá met ti ka- dakkél ti útanngmo a panag- pakúrañg</i>	the richer you are the more you are obliged to be humble.
<i>kas iti kaláwa ti tálonmo kas- táto met ti kaadú ti pa- gayna</i>	according to the width of your rice field, such will be the quantity of its rice.
<i>kas kenká kastá met kaniák kas iti inarámidmo kastáto met ti aramiden dagiti an- nákmo</i>	as with you so also with me. as you did so also will your children do.
<i>no kasanó ti gagétna kastán- to met ti maálana a gon- goná</i>	he will get a reward in accordance with his diligence.
<i>no kasanó ti agturáy kastá met ti ituturayánda</i>	as with the governors so also the governed.
<i>no kasanó ti kaatiddágna kas- tá komá met ti kaakábana</i>	it should be as broad as it is long.

2. "So . . . that" is expressed by *kastá únay . . . ta* and *kastá únay . . . a* or *ñga*. Examples:

<i>kastá únay ti kaadú ti kin- nánna ta nagsakit iti báyat ti duá ñga aldáw</i>	he ate so much that he was ill for two days.
<i>kastá únay ti sadútna ta dína kayát ti mañgasáwa</i>	he is so lazy that he doesn't want to marry.
<i>kastá únay ti gagétna ta na- kagátanngdan iti baláyda</i>	they are so active that they have been able to buy a house.

<i>kastá únay ti kabassít ti bagás ditóy ili a rebbénḡ datáo ti maṅḡán ití sá-bog</i>	there is so little rice in this town that one is obliged to eat millet.
<i>kastá únay ti saóna a nag-buténḡ dagiti isú ámin a kaaróbana</i>	he talked so loudly that all his neighbors were afraid.

IV. "Especially" is expressed by one of the following terms, followed or not by *no* or *ta*: (*naṅḡ*) *naṅḡróna* (*únay*), *saṅḡ-kaṅḡróna* (*únay*), *maysá únay*, *láló* (*únay*), *agláló* (*únay*).
Examples:

<i>naṅḡróna ití bigát</i>	especially in the morning.
<i>díka mapán naṅḡróna únay ta agsakít ti ólom</i>	don't go especially now that you have the headache.
<i>naṅḡroná únay no awán ti ápit</i>	especially when there is no harvest.
<i>naṅḡnaṅḡróna únay ti ólona dákesto maysá únay no saán ṅga umáy ti ur-uráyenna láló no kitkitáenna</i>	especially his head. it will be bad especially if the one he is waiting for does not come. especially when he looks at it.
<i>tarimaáнем ti panagsaóm agláló kadagiti agturáy</i>	mind your speech especially when (talking) to persons in authority.
<i>saán a makapagná akláló ta dákes ti dалан</i>	he cannot walk especially on account of the bad road.
<i>agláló únay no madi ti bakét-na</i>	especially if his wife refuses.

NOTE 24.—*Sáman* (*no*) is a conjunction of little use; it means "as if", and ordinarily occurs in the form of *sáman* (*no*) *dí*, "as if not".
Examples:

<i>sáman no dakkél ti kinabak-nánḡna</i>	as if he were rich.
<i>nagagétida konáda sáman no makapaṅgabélda ta mabayágda a masakiten</i>	they are diligent, they say, as if they could weave being ill for so long a time.
<i>adú pay ti págay konáda sáman dí inibús ti dódon</i>	they say that there is much rice as if the locusts had not ravaged (the fields).
<i>umanáy sáman no dí isú ti kakaroán a dúsa</i>	it is enough, as if it were not the heaviest punishment.
<i>abábaw ti karayán konák sáman no dí adálem</i>	I thought the river was shallow but it seems to be deep.
<i>adú ti ayabánda sáman no díkam bassít</i>	they call many as if we were not few.

XII. OTHER CONJUNCTIONS

1. *Tapnó*, "so that, in order that", and so on; "lest", in negative clauses. Examples:

<i>pinaayabánka tapnó kitáem daytáy</i>	I had called so that you look at this.
---	--

<i>denṅgém ti saóda tapnó dída- ka sapliten</i>	hear their words lest they whip you.
<i>patiém tapnó maikaríka ṅga ayaténna</i>	believe it so that you deserve his love.
<i>ginátanṅko ti baláyna tapnó di mapúkaw ti pirákko</i>	I bought his house so that my money does not get lost.
<i>simmanṅpét datóy íli tapnó makabírok iti gatgatánṅen- ṅa</i>	he arrived in this town to look for things to buy.
<i>agánuska tapnó addá gongo- nám</i>	be patient so that you have a re- ward.

2. *Maysá pay* and *sánto maysá*, "besides". Cfr. also The Conjunction "because". Examples:

<i>awán kadakamí ti maṅṅán ití daytá maysá pay na- ṅgina únay</i>	none of us eats that and besides it is very expensive.
<i>madí ti nákemko maysá pay addá sakít ití dítoyko</i>	I am against it and besides I feel pain here.
<i>no mapán met ti lakáymo sánto maysá nasayáat ti dálán</i>	and your husband also goes, besides the road is good.
<i>adú ti págayna sánto maysá nakiasáwa ití baknánṅ</i>	she has much rice and besides she married a rich man.

3. *Malaksid no*, "except if". Examples:

<i>díka gatánṅen malaksid no saánmo ṅga ammó no sa- dín ti paṅgipanám ití pi- rákmo</i>	don't buy it except if you don't know where to carry your money.
<i>awán ti mayát malaksid no kumúyogka</i>	nobody is willing except if you go with them.
<i>kayátko ti mapán idiáy Bon- tók malaksid no awán ti maṅṅisúro ití dálán</i>	I want to go to Bontok except if there is nobody to show me the way.

4. *No kasta*. "thus". Examples:

<i>no kastá awán</i>	thus he is not there?
<i>agánṅes no kastá saán pay a natáy</i>	he breathes, thus he is not yet dead.
<i>addá no kastá ínkan</i>	he is here, thus go now.
<i>no kastá awánen</i>	if so we are done for.

5. *Dáel, dáel láenṅ, dáel kad pay* and *dáel sa kad pay*, followed by *no* or *ta*, "it is well, scarcely", and so on (rarely used). Examples:

<i>dáel ta makíta daydiáy a ba- láy</i>	that house is scarcely visible.
<i>dáel láenṅ ta maṅṅṅég ti tímekna</i>	his voice is scarcely audible.
<i>dáel kad pay ta addá igá- tanṅko</i>	it is well that I have something to buy with.

<i>dáel sa kad pay no addá</i>	it were well would somebody buy it,
<i>gumátañg ta madadáelen</i>	as it is getting spoiled.
<i>dáel sa kad pay ta nanñgtéd</i>	he scarcely gave.

6. *Asi (pay)* and *ay-áy (pay)*, "woe to". Examples:

<i>ási pay ni Juán</i>	woe to John.
<i>ásikanto pay</i>	woe will be you.
<i>ay-áyka ubiñg</i>	woe to you, child.
<i>ay-ayak pay ití kastóy a gá-satko</i>	woe to me for having such luck (bad).

NOTE 25.—*Alánto (kad) no* and *ásinto (no)* have become antiquated. Examples:

<i>alánto kad no madánondaka</i>	woe to you if they find you here.
<i>ditóy</i>	
<i>ásinto no maibbatánna</i>	woe to him if he drops it.

APPENDIX: THE INTERJECTION

1. The following are the most used interjections, some of them being sometimes used as conjunctions:

<i>ay</i>	"ah."
<i>ay píman píman, píman</i> and <i>kaási</i>	"alas; poor (boy, and so on)".

Kailalá (pay), *ilala pay* and *alalá pay*, alas it is a pity. Examples:

<i>kailalá ti bññga a nabóonñg</i>	it is a pity the pot is broken.
<i>kaililá pay ti ayátda kenka</i>	it is a pity they loved you.
<i>ilalá pay ti rígatda</i>	it is a pity they endured much hardship.
<i>alalá pay ti págay a nada-dáel</i>	it is a pity the rice is ruined.

Assí, pes and *puég*: expressing disgust.

Assiáy and *issiáy*: expressing disgust mixed with wonder.

Ni, ii and *na*: expressing wonder.

Allá: wondering and threatening.

Apayá únayen, *ayá únayen*, *ápa únayen*, *anía únayen*, *únay mettén* and *únayen*: expressing wonder more or less mixed with the notion of opposition. Examples:

<i>ayá únay komán no denñg-génnak</i>	I wish you would listen to me.
<i>ápa únay ti bayágdan</i>	what is the matter that they stay so long?
<i>únaykan</i>	what is the matter with you?

NOTE 26.—The interjections *abagá*, *abágay* and *apaká* have become antiquated.

Ananáy and *annáy*: expressing pain.

Oy: calling or attracting attention.

Alá and *alég*: driving on. Examples:

<i>agtaráyka alá</i>	run now.
<i>alá wen</i>	all right.

Alá man, *alá kadí*, *alá komá*, *alán* and *alég komá*: asking a favor. Examples:

<i>alá komá katalékmi italiáw-</i>	turn then, most gracious advocate,
<i>mo kadakám dagitá matám</i>	thine eyes of mercy towards us.
<i>a manaññgaási</i>	

Baá: to startle people or to make children laugh.

Uray, *úrayen*, *úray láenñgen* and *di kad úray*, "even so; never mind".

Sápáy (*komá*) *ta kastá*, "amen; be it so".

Tóto, *tóo* and *kóta*: calling dogs.

Rísay and *urísay*: calling pigs.

Sa: calling or driving away cats. The difference lies in the pronunciation: *sa*, short and strong: driving away; *sa*, long and smooth: calling.

Siú: driving away chickens, pigs, and so on.

II. The following are the usual greetings of the Iloko:

A. With or without a possessive of the second person: Examples:

naimbág ñga aldáw, "good day".

naimbág a malém, "good afternoon".

naimbág a rabíi, "good evening; good night".

naimbág a fiésta, "happy feast".

naimbág a páskua, "happy feast (Christmas, Easter; sometimes Epiphany, Whitsuntide)".

naimbág a viáje, "I wish you a happy trip" (to persons going on a journey).

naimbág ñga isasaññpét, "welcome" (to persons coming home).

B. With or without a personal pronoun of the second person in the oblique:

Diós ti agñgína (*kenká* or *kadakayó*), "thank you" (literally: may God repay you).

Diós ti bumáles, "thank you" (may God return it).

Diós ti kumáyog, "may God go with you" (to persons going away).

Diós ti agbáti, "may God stay (with you)" (said by persons going away).

Diós ti manñgágas, "may God cure you" (to sick or tired persons).

Diós ti manñgliwliwá, "may God console you" (to bereaved persons).

C. *Yáman pay*, "thank you"; also the usual answer of the inmates of a house to the greeting of a person making a call.

awán aníá man, "you are welcome", answering "thank you".

lumábaskami (*pay*), "we pass", when passing over the grounds of and near somebody else's house.

NOTE 27.—"The late" is expressed by *ni Dios ti aluádna*, followed by the ligature *a* or *nga*, and by *ni . . . a Dios ti aluádna*. Examples:

<i>ni Diós ti aluádna nga asáwak</i>	my late husband; my late wife.
<i>ni Luís a Diós ti aluádna</i>	the late Lewis.

BOOKS

Books reviewed here were received from their respective publishers by The Philippine Journal of Science and are acknowledged in this section.

First-Year Mathematics for Colleges. By Paul R. Rider. New York, The Macmillan Company, 1949. 714 pp. Price ₱10.00

This book is intended principally as a textbook in first year mathematics for colleges. The methods of presentation are those used in Rider's "College Algebra, Plane and Spherical Trigonometry, and Analytic Geometry". The treatment of the topics is very clear and the arrangement of the subject matter, logical. The book has been provided with a complete index which enhances its usefulness. It is a good regular text in universities as well as a suitable reference book in a college library.—E. R.

Alternating Current Machinery. By L. V. Bewley. The Macmillan Company, 1949. 376 pp. Price, \$5.25.

This book is unusual in two respects: 1. It presents the theory and characteristics of alternating current machinery with two general equations: (a) the equation of voltage and (b) the equations of armature reaction, and 2. It gives the most recent advances in theory and method of analysis applied to alternating current machinery.

The use of the two general equations presented in the book makes it possible to distinguish one electrical machinery as differing from another by either the presence or absence of specific terms in the general equations. The general equations, therefore, are to the field of electrical engineering as the Bernoulli equation is to hydraulics. It must be said, however, that it is not possible to do away completely with the old methods of solving the old equations. The author eliminated the useless methods and equations, and discussed applicable ones in his book: It is not too much to expect that as the method pioneered by the author becomes more generally understood and wisely applied, a greater unification of ideas and basic concepts will result in the field of electrical machinery.

Other important and interesting features introduced by the author in the book are the following: 1. The concept of a fictitious winding in a transformer to account for the core loss and to represent the consolidated eddy-current circuits; 2. The step-by-step development of the equations, vector diagrams and equivalent circuits of the transformer and poly-phase induction motor; and 3. The cross-field principles involved in the single phase induction motor which is made clear by referring to time and space vector diagrams.

One may criticize this text on the omission of discussions on flux distribution in slots, air gaps and around field poles in electrical machineries, and eddy-current loss in conductors which are usually part and parcel of books in this general field. The author, in his book "Two Dimensional Fields In Electrical Engineering", treated these subjects exhaustively. Other topics that are omitted are the mercury arc, rectifier, electronic devices and the eddy-current and hysteresis motors which are used in instrumentation. I agree with the author that these electrical machinery should be treated in separate books on industrial electronics and specialized electrical machines.

Simplifying assumptions are used extensively in the book. In fact, in some instances, the simplifications have become oversimplifications. It must be said, however, that the mathematical manipulation necessary for complete understanding of a subject is omitted in the interest of simplification.

This book can be recommended as a reference for practicing engineers and as a text in electrical engineering course.—
F. V. E.

Pre-Medical Physical Chemistry. By F. A. Matsen, Jack Myers and Norman Hackerman. N. Y., The Macmillan Company, 1949. 344 pp., illus. Price, \$4.50

As its title implies, the authors intended this book for pre-medical students only, and as such this is not the usual physical chemistry text. In carrying out this intention, only those "chemistry principles which now have, or expected will have, application to the study of medicine and other biological sciences" are treated comprehensively as in the case of surface phenomena.

The topics covered have been chosen with a purpose. The first chapter reviews elementary mathematics and introduces more advanced mathematical operations. The material is so arranged as to give the instructor enough leeway in the preparation of the course so that topics may be omitted without a serious consequence. At the end of every chapter references to assist the student desiring additional information, and problems to provide review and exercise are given.

Going through its twenty-five chapters, one will find that the book is far from being an easy one and the aim of the authors have been more than adequately fulfilled.—L. G. A.

Physical Chemical Experiments. By Robert Livingston. Revised Edition. New York, The Macmillan Company, 1948. 267 pp. Price, \$3.50

An interesting feature of this book is the detailed discussion on measurements, errors and computations with formulas, equations and illustrations, which are substantiated with experiments for easy comprehension and application. This part of the book is very useful and handy as it eliminates the necessity of consulting various references for these processes.

The book contains fifty experiments presented in the same manner as those of other textbooks on laboratory or experimental physical chemistry. The theoretical consideration is as usual, at the beginning of each experiment, followed by the apparatus, materials, procedure and lastly computations. One noticeable feature in the description of the various experiments is the absence of details. Details were apparently omitted, leaving them entirely to the student in order to develop discretion, initiative and resourcefulness. Also, experiments presented in this book are those requiring minimum expense for equipment but sufficient to acquaint the student with the fundamental principles involved in the course of experimental physical chemistry.

The value of this book should be well appreciated by the student whose interests extend to the practical applications of some of the experiments to organic chemistry, chemical engineering, biochemistry and other allied subjects.—N. F. M.

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CONTENTS

	Page
COPELAND, EDWIN B. The origin of the Philippine fern flora	1
HSU, SHOU-TAI and BOO-YEN WEI. A new species of <i>Nematodirus</i> (Nematoda: Trichostrongylidae) from sheep	7
DILLON, LAWRENCE S. and ELIZABETH S. DILLON. The Lamiine tribe Gnomini (Cleoptera, Cerambycidae)	11
PAUL, ASOKA KUMAR and ROBINDRA MOHON DATTA. Structure and development of the female gametophyte in <i>Crotalaria intermedia</i> Kotschy	59
MENG, CHI'NG HUA and GERALD F. WINFIELD. Studies on the control of fecal-borne diseases in North-China. XV. An approach to the quatitative study of the house frequenting fly population. C. The Characteristics of a rural fly population	67
VANOVERBERGH, MORICE. Ligatures and conjunctions in Iloko.....	87
BOOKS	133